Before The Federal Energy Regulatory Commission

DRAFT
APPLICATION FOR NEW LICENSE

OROVILLE DIVISION, STATE WATER FACILITIES
FERC PROJECT NO. 2100

VOLUME I

DRAFT APPLICATION AND TECHNICAL EXHIBITS

State of California
The Resources Agency
Department of Water Resources

APRIL 30, 2004

Public Document

BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION
DRAFT APPLICATION FOR NEW LICENSE

APPLICATION OF
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

FOR THE
OROVILLE DIVISION, STATE WATER FACILITIES

FERC PROJECT NO. 2100

PURSUANT TO:
Code of Federal Regulations
Title 18-Conservation of Power and Water Resources
Chapter 1, Subchapter B
Part 4, Subpart D, Section 4.38
Part 4, Subpart F, Sections 4.50 and 4.51
and
Part 16, Subpart B

This is Volume I of the Application of the undersigned for a new License for the Oroville Facilities, FERC No. 2100, made this _____ day of _____, 20___.

THE STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

By: _____
Lester A. Snow
Director

Letter of Transmittal

Volume I: Draft Application and Technical Exhibits
Initial Statement
Exhibit A: Project Description
Exhibit B: Project Operation and Resource Utilization
Exhibit C: Construction History and Proposed Construction Schedule
Exhibit D: Statement of Costs and Financing
Exhibit H: Information Required for New License *(Note: Exhibit H is not included with Draft License Application. It will be submitted to FERC with the Final License Application).*

Volume II: Preliminary Draft Environmental Assessment (PDEA) Progress Summary

Section 1.0 Introduction
Section 2.0 Purpose and Need for Action
Section 3.0 Development and Description of the Proposed Action and Alternatives
Section 4.0 Affected Environment and Environmental Consequences
Section 5.0 Other Statutory Requirements
Section 6.0 Developmental and Economic Analysis
Section 7.0 Comprehensive Development Analysis and Recommendations
Section 8.0 Recommendations of Fish and Wildlife Agencies
Section 9.0 Consistency with Comprehensive Plans
Section 10.0 Literature Cited
Section 11.0 List of Preparers and Reviewers
Section 12.0 List of Recipients

Volume III: *(not for public distribution)*
Exhibit F: Supporting Design Report and General Design Drawings
Exhibit G: Project Maps

Note: Volume III is being provided to FERC only. It contains Critical Energy Infrastructure Information (CEII), which under FERC's Order No. 630-A is being withheld from public viewing. To view this information, a CEII request may be filed under the provisions of 18 C.F.R. Section 388.113 or a FOIA request may be filed under 18 C.F.R. Section 388.108.

The California Public Records Act does not require the disclosure of any record the disclosure of which is exempted or prohibited pursuant to federal law (Cal. Govt. Code Section 6254(k)).

DRAFT APPLICATION FOR NEW LICENSE

OROVILLE DIVISION, STATE WATER FACILITIES
FERC PROJECT NO. 2100

Volume I: Draft Application and Technical Exhibits

Initial Statement

Exhibit A: Project Description

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DRAFT
INITIAL STATEMENT

BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION
APPLICATION FOR NEW LICENSE

(1) The Department of Water Resources (DWR or Applicant) applies to the Federal Energy Regulatory Commission (FERC) for a new license for a fifty-year term for the Oroville Division, State Water Facilities as described in the attached exhibits. The Federal Power Commission (now FERC) in February 1957 licensed the Feather River Project (also known as the Oroville Division, State Water Facilities) as Project No. 2100. The Applicant's existing license for the Project expires on January 31, 2007.

(2) The location of the Project is:

State or Territory:	California
County:	Butte
Township or nearby town:	Oroville
Stream or other body of water:	Feather River

(3) The exact name, business address and telephone number of the Applicant are:

Department of Water Resources
1416 Ninth Street
P.O. Box 942836
Sacramento, California 94236-0001

The exact names, business addresses and telephone numbers of each person authorized to act as agent for the Applicant in the application are:

Lester Snow, Director
Department of Water Resources
1416 Ninth Street
P.O. Box 942836
Sacramento, California 94236-0001
Telephone: (916) 653-7007

(4) The Applicant is an agency of the State of California organized and existing pursuant to the laws of the State of California. It is a municipality within the meaning of Section 796(7) of the Federal Power Act.

(5)(i) The statutory or regulatory requirements of the State in which the Project is located that affect the Project as proposed, with respect to bed and banks and to the appropriation, diversion, and use of water for power purposes, and with

respect to the right to engage in the business of developing, transmitting, and distributing power and in any other business necessary to accomplish the purposes of the license under the Federal Power Act, are:

- California Water Code Section 11295 authorizes DWR to construct and operate plants and works for the generation, transmission, sale and use of electric power.
- California Water Code Section 11130 authorizes DWR to use any State real property including the land lying beneath any navigable waters of the state for the purpose of the State Water Project, which includes the Oroville Facilities.
- California Water Code Section 1375 *et seq*. authorizes the State Water Resources Control Board to issue water rights permits.
- California Water Code Section 13160 authorizes the State Water Resources Control Board (SWRCB) to act as the State water pollution control agency for purposes of compliance with Section 401 of the Federal Clean Water Act, including providing a certificate that a federally authorized activity will not reduce water quality below applicable standards.

(5)(ii) The steps that the Applicant has taken or plans to take to comply with each of the laws cited above are:

1. DWR has been in continuous compliance with, and has properly sought and obtained all consents, approvals, and other authorizations required to be obtained from time to time by DWR pursuant to California law.

2. The SWRCB has issued four water rights permits to DWR covering the operation of the Oroville Facilities: (a) two permits, P16477 and P16480, allow the use of up to 11,000 cfs of direct diversion and up to 3,880,000 acre-feet per year diversion to storage for power generation at the Oroville Facilities, including incidental recreation and fish and wildlife enhancement; and (b) two permits, P 16478 and P16479, allow the use of the same quantities of water for consumptive use purposes.

3. A request for water quality certification will be filed with the SWRCB after the Final Application for License is filed with FERC consistent with FERC requirements and guidance.

(6) The existing Oroville Facilities are owned by:

State of California, acting by and through
Department of Water Resources
1416 Ninth Street
P.O. Box 942836
Sacramento, California 94236-0001

The following exhibits are filed herewith and are hereby made a part of this application:

Exhibit A: Project Description

Exhibit B: Project Operation

Exhibit C: Construction History

Exhibit D: Costs and Financing

Exhibit F: Drawings of the Project Works and Supporting Design Report

Exhibit G: Map of the Project

Exhibit H: Information Required for New License

PDEA: Preliminary Draft Environmental Assessment

This application is executed in the

State of California)

) ss.

County of Sacramento)

By: Lester Snow, Director
Department of Water Resources
1416 Ninth Street
P.O. Box 942836
Sacramento, California 94236-0001

The undersigned, being duly sworn, deposes and says that the contents of this application are true to the best of his or her knowledge or belief. The undersigned Applicant has signed his application this ____ day of January 2005.

DEPARTMENT OF WATER RESOURCES (APPLICANT)

By: _____

Name

Subscribed and sworn to before me this ____ day of January 2005.

_____

Notary Public, State of California
My Commission Expires: _____

State of California
The Resources Agency
Department of Water Resources

DRAFT
EXHIBIT A – PROJECT DESCRIPTION

Oroville Division, State Water Facilities
FERC Project No. 2100

APRIL 30, 2004

ARNOLD SCHWARZENEGGER
Governor
State of California

MIKE CHRISMAN
Secretary for Resources
The Resources Agency

LESTER A. SNOW
Director
Department of Water Resources

State of California
The Resources Agency
Department of Water Resources

DRAFT
EXHIBIT A – PROJECT DESCRIPTION

Oroville Division, State Water Facilities
FERC Project No. 2100

This report was prepared under the direction of

Rashid Ahmad ..... Supervising Engineer, W.R., DWR-DOE
Lori Brown ..... Senior HEP Utility Engineer, DWR-SWPAO
Sergio Escobar ..... Supervising Engineer, W.R., DWR-DOE

by

Dinh Nguyen ..... Senior Engineer, W.R., DWR-DOE
Larry Lopez ..... Engineer, W.R., DWR-DOE
Tai Le ..... Engineer, W.R., DWR-DOE

Assisted by

Howard E. Lee ..... Manager, MWH/EDAW Team

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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1.0 GENERAL PROJECT DESCRIPTION

1.1 OVERVIEW

The Oroville Facilities (FERC Project No. 2100) were developed as part of the State Water Project (SWP), a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose of the SWP is to store and distribute water to supplement the needs of urban and agricultural water users in northern California, the San Francisco Bay area, the San Joaquin Valley, and southern California. The Oroville Facilities are also operated for flood management, power generation, water quality improvement in the Delta, and recreation and fish and wildlife enhancement.

FERC Project No. 2100 encompasses 41,100 acres and includes Oroville Dam and Reservoir, three power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Power Plant, and Thermalito Pumping-Generating Plant), Thermalito Diversion Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal, Oroville Wildlife Area (OWA), Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, and transmission lines, as well as a number of recreational facilities. An overview of these facilities is provided on Figure A.1.0-1. The Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5-million-acre-feet (maf) capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level.

1.2 EXISTING POWER FACILITIES

The hydroelectric facilities have a combined license generating capacity of approximately 762 megawatts (MW). The Hyatt Pumping-Generating Plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels into the Feather River just downstream of Oroville Dam. The plant has a generating and pumping flow capacity of 16,950 cfs and 5,610 cfs, respectively. Other generation facilities include the 3 MW Thermalito Diversion Dam Powerplant and the 114 MW Thermalito Pumping-Generating Plant.

Thermalito Diversion Dam, four miles downstream of the Oroville Dam creates a tail water pool for the Hyatt Pumping-Generating Plant and is used to divert water to the Thermalito Power Canal. The Thermalito Diversion Dam Power Plant is a 3 MW power plant located on the left abutment of the Diversion Dam. The power plant releases a maximum of 615 cubic feet per second (cfs) of water into the river. The Thermalito Power Canal is a 10,000-foot-long channel designed to convey generating flows of 6,900 cfs to the Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. The Thermalito Forebay is an off-stream regulating reservoir for the 114 MW Thermalito Pumping-Generating Plant.

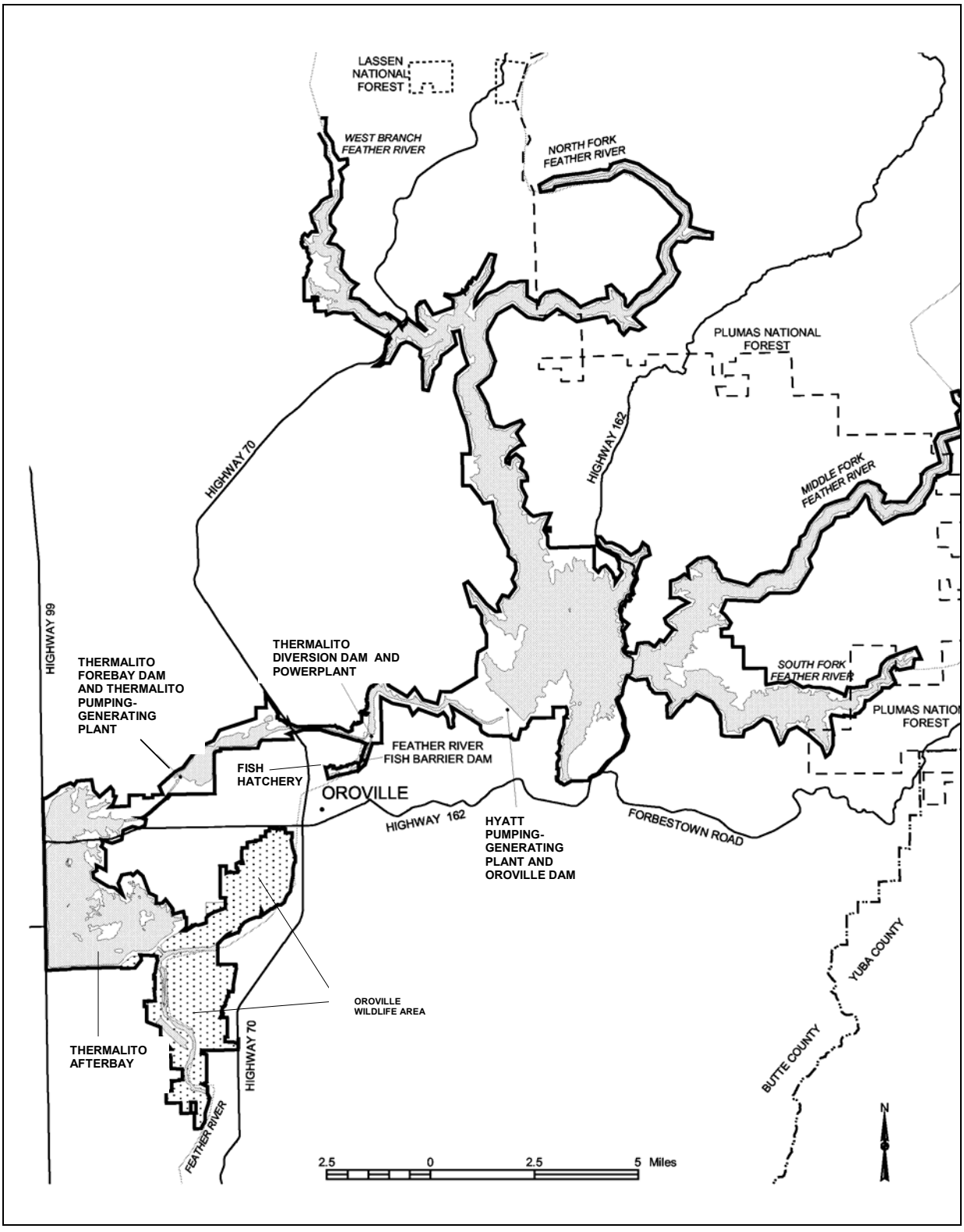

Figure A.1.0-1. Oroville Facilities Features Location Map

The Thermalito Pumping-Generating Plant is designed to operate in tandem with the Hyatt Pumping-Generating Plant and has generating and pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into the Thermalito Afterbay, which is contained by a 42,000-foot-long earth-fill dam. Thermalito Afterbay is used to release water into the Feather River downstream of the Oroville Facilities, helps regulate the power system, provides storage for pump-back operations, and provides recreational opportunities. Several local irrigation districts receive water from Thermalito Afterbay.

1.3 EXISTING ENVIRONMENTAL AND RECREATION COMMITMENTS

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the dam and the Thermalito Afterbay Outlet and provides attraction flow for the hatchery. The Feather River Fish Hatchery, an anadromous fish hatchery, was built to compensate for the loss of spawning grounds and rearing areas for returning salmon and steelhead trout and their offspring; the spawning grounds and rearing areas were lost due to construction of Oroville Dam. The hatchery has recently accommodated more than 20,000 adult fish and 15 million young fish annually.

The Oroville Facilities support a wide variety of recreational opportunities. These opportunities include: boating (several types), fishing (several types), fully developed and primitive camping (including boat-in and floating sites), picnicking, swimming, horseback riding, hiking, off-road bicycle riding, wildlife watching, and hunting. There are also visitor information sites with cultural and informational displays about the developed facilities and the natural environment. There are major recreation facilities at Loafer Creek, Bidwell Canyon, Spillway, North and South Thermalito Forebay, and Lime Saddle. Lake Oroville has two full-service marinas, five car-top boat launch ramps, ten floating campsites, and seven dispersed floating toilets. There are also recreation facilities at the Visitors Center and the OWA.

The OWA comprises approximately 11,000-acres west of Oroville that is managed for wildlife habitat and recreational activities. It includes the Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The 5,000-acre area straddles 12 miles of the Feather River, which includes willow and cottonwood-bordered ponds, islands, and channels. Recreation areas include dispersed recreation (hunting, fishing, and bird watching), plus recreation at developed sites, including Monument Hill Day Use Area, model airplane grounds, three boat launches on Thermalito Afterbay and two on the river, and two primitive camping areas. California Department of Fish and Game's (DFG) habitat enhancement program includes a wood duck nest-box program and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a number of locations.

2.0 DESCRIPTION OF EXISTING OROVILLE FACILITIES' FEATURES

2.1 DAMS, RESERVOIRS AND POWER FACILITIES

2.1.1 Lake Oroville

Lake Oroville stores winter and spring runoff that is released into the Feather River as necessary for project purposes. The reservoir is fed by the North, Middle, and South Forks of the Feather River. Average annual unimpaired runoff into the lake is about 4.2-million-acre-feet (maf).

Table A.2.1-1. Lake Oroville Technical Data.

Lake Oroville	Specification
Maximum Water Surface Elevation	900 feet
Minimum Water Surface elevation	640 feet
Drainage Area	3,624 square-miles
Maximum Storage	3.5 million-acre-feet
Usable Storage	2.8 million-acre-feet
Maximum Water Surface Area	15,810 acres
Shoreline length @ Maximum Storage	167 miles

Source: CSWR Bulletin Number 200 – Volume III

2.1.2 Oroville Dam

The Oroville Dam is the highest earthfill dam in the United States. The embankment is made up of an inclined impervious clay core resting on a concrete core block, with appropriate transitions and rock-filled shell zones on both sides.

The spillway, located on the right abutment of the dam, has two separate elements: a controlled gated outlet and an emergency uncontrolled spillway. The gated control structure consists of an unlined approach channel, gated headworks, and a lined chute. The concrete-lined chute, 3,050 feet long, extends from the flood control outlet down to a terminal structure where the water flows into the Feather River. The emergency uncontrolled spillway is designed so that water could flow over the emergency spillway weir and down the undeveloped canyon slope to the river.

The Palermo Outlet Works, concrete-lined and approximately 2,430 feet long, was designed to release water into the Palermo Canal located downstream of the Dam. It has two separate structures: intake portal and downstream portal. The intake portal structure consists of a short length of cut-and-cover tunnel section while the downstream portal structure consists of a concrete headwall and wingwalls paralleling the channel.

Table A.2.1-2. Oroville Dam, Spillway and Outlet Technical Data.

Oroville Dam	
Type	Earthfill
Volume	80,000 cubic-yards
Height from Base of Dam	770 feet
Crest Elevation	922 feet
Crest Width	51 feet
Crest Length	6,920 feet
Oroville Dam Spillway	
Emergency Spillway	
Type	Overflow weir
Crest Elevation	901 feet
Crest Length	1,730 feet
Control Spillway	
Type	Gated outlet
Ogee Crest Elevation	813.6 feet
Control	8 radial gates, each 17ft-7in. wide by 33ft-6in. high.
Controlled Maximum Flow	150,000 cfs
Hoist	Electric
Palermo Outlet Works	
Tunnel	6 feet diameter with valve chamber
Capacity	40 cfs
Intake Structure	
Length	27 feet
Invert Elevation	549 feet
Downstream Structure	
Flume type	Reinforced concrete
Flume width	5 feet

Source: CSWR Bulletin Number 200 – Volume III

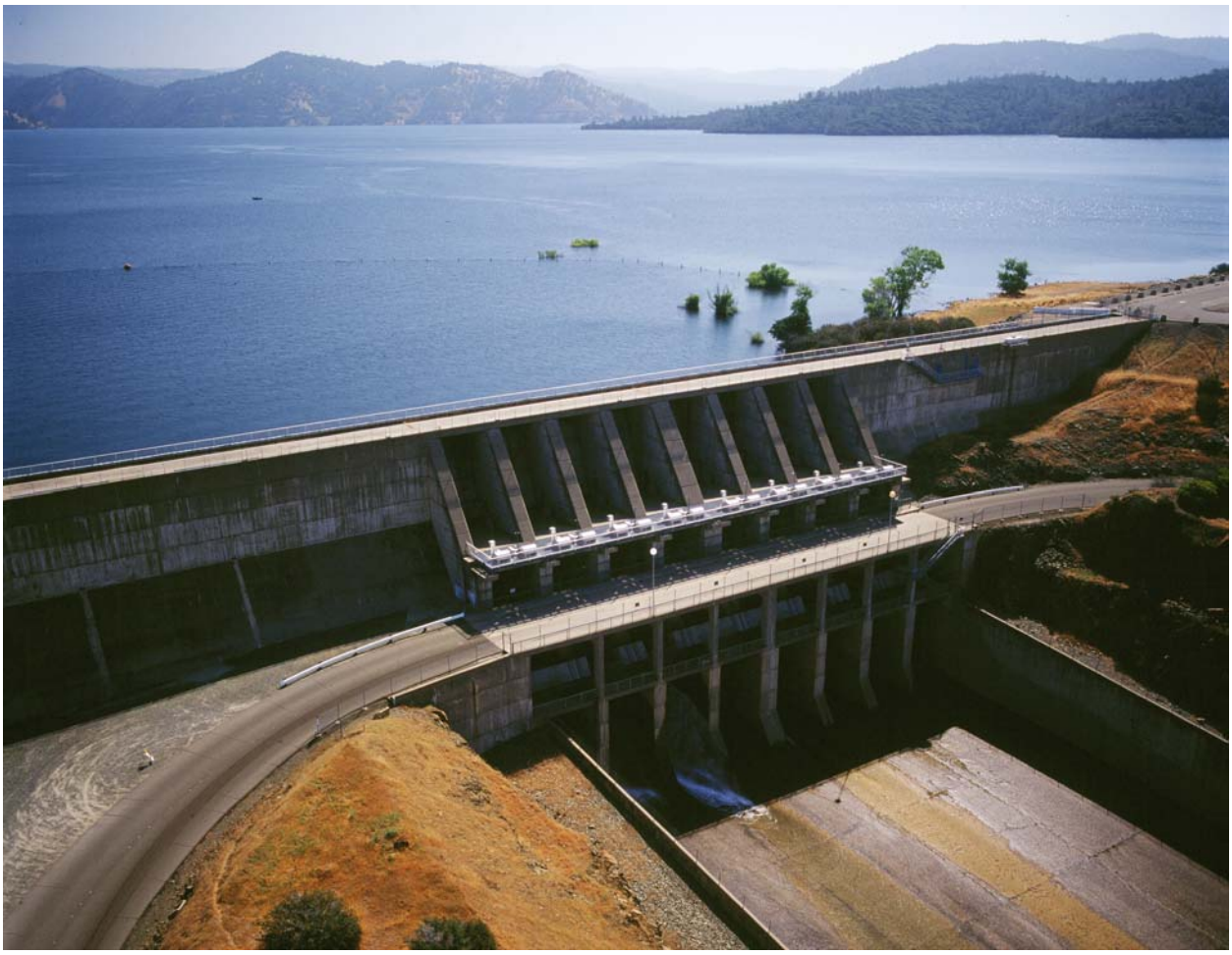

Figure A.2.0-1. Lake Oroville and Oroville Dam

2.1.3 Saddle Dams

Saddle Dams include Bidwell Canyon and Parish Camp and complement Oroville Dam in containing Lake Oroville. Bidwell Canyon Saddle Dam is located two miles southeast of Oroville Dam, consisting of two separate embankments. Parish Camp Saddle Dam is located on the West Branch arm of the reservoir and is 12 miles north of Oroville Dam.

Table A.2.1-3. Saddle Dams Technical Data.

Bidwell Canyon Saddle Dam	
Type	Earth and rockfill
Height from Base of Dam	47 feet
Crest Elevation	922 feet
Crest Width	30 feet
Crest Length	2,270 feet
Embankment Volume	175,000 cubic yards
Side Slope	2.5:1
Parish Camp Saddle Dam	
Type	Earth and rockfill
Height from Base of Dam	27 feet
Crest Elevation	922 feet
Crest Width	30 feet
Crest Length	280 feet
Embankment Volume	11,000 cubic yards
Side Slope	2.5:1

Source: CSWR Bulletin Number 200 – Volume III and Final Construction Report

2.1.4 Hyatt Pumping-Generating Plant

Most of the water released from Lake Oroville passes through Hyatt Pumping-Generating Plant, located in the left abutment of Oroville Dam. Water from the six-unit underground power plant is discharged through two tunnels into the Feather River just downstream of Oroville Dam.

The power plant facilities consist of an intake structure, two penstock tunnels, six penstock branch lines, an underground powerhouse, three turbine units, three reversible pump-turbine units, two tailrace tunnels and outlet works, a control building and a switchyard. The underground powerhouse measures approximately 550-feet long, 69-feet wide, and 140-feet high.

Three of the six generating units are conventional generators driven by vertical-shaft, Francis-type turbines; the other three are motor-generators coupled to Francis-type, reversible pump turbines. The latter units allow off-peak pumped-storage operations.

The intake structure for the power plant consists of two parallel intake channels, one each for two penstock tunnels. The intake openings are protected by stainless-steel

trashracks. The intake structure has an overflow type shutter system, approximately 40-feet square, that determines the level from which water is withdrawn from Lake Oroville.

The main control building and a 230-kV switchyard are located above ground approximately 1,500 feet southwest of the underground powerhouse. Three overhead transmission lines extend approximately nine miles from the switchyard to PG&E's Table Mountain Substation.

Table A.2.1-4. Technical Data for Hyatt Pumping-Generating Plant.

Specification	Pumping	Generating
License Capacity	5,610 cfs & 519,000 hp	645 MW & 16,950 cfs
Normal Static Head	500-660 feet	410-676 feet
Design Dynamic Head	592 feet	615 feet
Number of Units	3 (pumping/generating)	6 - (3 generating & 3 pumping/generating)
Unit Size	1,870 cfs & 173,000 hp	(g) 123 mVA & 2,850 cfs 3 (p/g) 115 mVA & 2,800 cfs
Penstock Diameter		2 @ 22 feet
Tailrace Diameter		2 @ 35 feet

Figure A.2.0-2. Hyatt Pumping-Generating Plant

2.1.5 Thermalito Diversion Dam, Pool, and Powerplant

2.1.5.1 Thermalito Diversion Dam

The Thermalito Diversion Dam is located approximately four miles downstream of Oroville Dam. The Thermalito Diversion Dam consists of a 625-foot-long concrete gravity dam with a regulated ogee spillway; and a canal-regulating headworks structure.

The dam has three purposes: (1) it diverts water into the two-mile long Thermalito Power Canal, which transports water to the Thermalito Pumping-Generating Plant for power generation; (2) it creates a tailwater pool (called the Thermalito Diversion Pool) for the Hyatt Pumping-Generating Plant; and (3) provides headwater for the Thermalito Diversion Dam Power Plant.

2.1.5.2 Thermalito Diversion Pool

The Thermalito Diversion Pool acts as a forebay when the Hyatt Pumping-Generating Plant is pumping water back into Lake Oroville.

Figure A.2.0-3. Lake Oroville, Oroville Dam, and the Thermalito Diversion Pool

2.1.5.3 Thermalito Diversion Dam Powerplant

The Thermalito Diversion Dam Power Plant is a hydroelectric power plant located below the left abutment of the Thermalito Diversion Dam. The water flows into the Feather River to maintain fish habitat between the Thermalito Diversion Dam and the Thermalito Afterbay Outlet. The power plant facilities consist of an intake headworks, inlet pipes, a single penstock, an underground powerhouse with one turbine unit, a tailrace channel and outlet works. The powerhouse measures approximately 53-feet long, 50-feet wide, and 42-feet high. Two 15-kV underground distribution lines extend approximately 3.9 miles and 1.1 miles from Thermalito Diversion Dam Powerplant Switchyard to Hyatt

Pumping-Generating Plant Switchyard and the Feather River Fish Hatchery, respectively.

Figure A.2.0-4. Thermalito Diversion Dam and Thermalito Diversion Dam Powerplant

Table A.2.1-5. Technical Data for Thermalito Diversion Dam, Pool, and Powerplant.

Thermalito Diversion Dam	
Dam	
Type	Concrete gravity
Volume	154,000 cubic-yards
Height from Base of Dam	143 feet
Crest Elevation	233 feet
Crest Width	51 feet
Crest Length	1,300 feet
Spillway	
Type	Gated outlet
Crest Length	560 feet
Ogee Crest Elevation	205 feet
Control	14 radial gates, each 40ft wide by 23ft high.
Controlled Maximum Flow	320,000 cfs
Hoist	Electric
Power Canal Headworks	
Type	Gated outlet
Sill Elevation	200.5 feet
Control	3 radial gates, each 26.67 ft wide by 25.8 ft high.
Controlled Maximum Flow	16,900 cfs
Hoist	Electric
Thermalito Diversion Pool	
Maximum Water Surface Elevation	225 feet
Minimum Water Surface elevation	221 feet
Maximum Storage	13,350 acre-feet
Maximum Water Surface Area	320 acres
Shoreline length @ Maximum Storage	10 miles
Thermalito Diversion Powerplant	
License Capacity	3 MW & 615 cfs
Normal Static Head	63-77 feet
Design Dynamic Head	67 feet
Number of Units	1
Unit Size	3.3 MVA & 615 cfs
Inlet Lines Diameter	2 @ 5 feet
Penstock Diameter	1 @ 7.5 feet

. *Source: CSWR Bulletin Number 200 – Volume III*

2.1.6 Thermalito Power Canal

Thermalito Power Canal hydraulically links the Thermalito Diversion Pool to the Thermalito Forebay and can convey water in either direction between the two facilities.

The headwork structure for the Thermalito Power Canal is located on the right abutment of the Thermalito Diversion Dam. The canal, 10,000 feet long, is designed to convey

maximum generating and pumping flows of 16,900 cfs and 9,000 cfs, respectively. The canal is concrete-lined with bottom width of 48-feet and 1.5 to 1 side slope.

Figure A.2.0-5. Thermalito Diversion Dam and the Thermalito Power Canal

2.1.7 Thermalito Forebay Dam and Forebay

2.1.7.1 Thermalito Forebay Dam

The Thermalito Forebay Dam is located about four miles west of the City of Oroville. The dam serves two purposes; (1) it creates a tailwater for the Hyatt Powerplant during pump-back operations; and (2) provides headwater for the Thermalito Pumping-Generating Plant.

2.1.7.2 Thermalito Forebay

Thermalito Forebay is an off-stream regulating reservoir for the Thermalito Pumping-Generating Plant. It is contained by the Thermalito Forebay Dam on the south and east and by Campbell Hills on the north and west.

The Forebay has three purposes: (1) it conveys generating and pumping flows between Thermalito Power Canal and Thermalito Pumping-Generating Plant; (2) it provides regulatory storage and surge damping for the Oroville Facilities; and (3) it serves as a recreational site.

Table A.2.1-6. Technical Data for Thermalito Forebay Dam and Forebay.

Thermalito Forebay Dam	
Type	Zoned Earthfill
Volume	1,840,000 cubic-yards
Height from Base of Dam	91 feet
Crest Elevation	231 feet
Crest Width	30 feet
Crest Length	15,900 feet
Thermalito Forebay	
Maximum Water Surface Elevation	225 feet
Minimum Water Surface elevation	222 feet
Maximum Storage	11,768 acre-feet
Maximum Water Surface Area	630 acres
Shoreline length @ Maximum Storage	10 miles

Source: CSWR Bulletin Number 200 – Volume III

Figure A.2.0-6. Thermalito Forebay and the Thermalito Forebay Dam

2.1.8 Thermalito Pumping-Generating Plant

The Thermalito Pumping-Generating Plant is designed to operate in tandem with the Hyatt Pumping-Generating Plant to produce power during on-peak periods. The plant provides generating and pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively.

The plant is an indoor type with an in-line arrangement of units. When in generating mode, the Thermalito Pumping-Generating Plant discharges into the Thermalito Afterbay via the Tail Channel. This channel is approximately 1.5-miles long and was constructed with 70-foot bottom width and 2:1 side slope.

Thermalito Pumping-Generating Plant Switchyard is located between the headworks structure and the powerhouse proper, utilizing a portion of the top deck of the

powerhouse substructure. One 230-kV transmission line extends approximately 2.3 miles from the Switchyard to PG&E's Table Mountain Substation.

Table A.2.1-7. Technical Data for Thermalito Pumping-Generating Plant.

Specification	Pumping	Generating
License Capacity	9,120 cfs & 120,000 hp	114 MW & 17,400 cfs
Normal Static Head	85-102 feet	85-102 feet
Design Dynamic Head	99 feet	95 feet
Number of Units	3 (pumping/generating)	4 (1 generating & 3 pumping/generating)
Unit Size	3,040 cfs & 40,000 hp	3 (p/g) 30.6 MVA & 4,200 cfs
		1 (g) 34 MVA & 4,800 cfs
Penstock/Diameter		1 @ 24 to 21 feet
		3 @ 21 to 18 feet

Figure A.2.0-7. Thermalito Pumping-Generating Plant

2.1.9 Thermalito Facilities

2.1.9.1 Thermalito Afterbay Dam

The Thermalito Afterbay Dam is located about six miles southwest of the City of Oroville. It is a homogeneous earthfill dam with the longest crest in the SWP system. The dam contains the Thermalito Afterbay on the south and west and by higher natural ground on the north and east.

2.1.9.2 Thermalito Afterbay

The Thermalito Afterbay is an offstream reservoir that has four purposes: (1) it provides storage for the water required by the pump-back operation; (2) it helps regulate the power system; (3) it produces controlled flow in the Feather River downstream from the Oroville Facilities; and (4) it provides recreational opportunities.

Figure A.2.0-8. Thermalito Afterbay and Thermalito Afterbay Dam

2.1.9.3 Thermalito Afterbay Outlet

The Thermalito Afterbay Outlet is situated in the southeast corner of the Afterbay, a location most convenient for discharge to the Feather River downstream of the Thermalito Diversion Dam. Water released from the outlet provides for downstream project use, stream flow maintenance, and water-right commitments.

2.1.9.4 Thermalito Afterbay Irrigation Outlets

The irrigation outlet facilities regulate, measure, and record deliveries. Sizes of the outlets were determined by the necessity to meet discharge requirements at minimum reservoir level and match existing water levels in the canal system. These structures include Western Canal, Richvale Canal and Sutter-Butte Canal outlet.

Table A.2.1-8. Technical Data for Afterbay Dam, Afterbay, and Outlet Works.

Thermalito Afterbay Dam	
Type	Earthfill
Volume	5,020,000 cubic-yards
Height from Base of Dam	39 feet
Crest Elevation	142 feet
Crest Width	30 feet
Crest Length	42,000 feet
Thermalito Afterbay	
Maximum Water Surface Elevation	136.5 feet
Minimum Water Surface elevation	123 feet
Maximum Storage	57,040 acre-feet
Maximum Water Surface Area	4,300 acres
Shoreline length @ Maximum Storage	26 miles
Thermalito Afterbay Outlet Works	
Type	Gated outlet
Sill Elevation	105 feet
Control	5 radial gates, each 14 ft wide by 14 ft high.
Controlled Maximum Flow	17,000 cfs
Hoist	Electric
Thermalito Afterbay Irrigation Outlets	
Western Canal	
Type	Gated outlet
Flow Sensing Method	Flow Tubes
Invert of Gate Opening Elevation	105 feet
Control	5 radial gates, each 8 ft wide by 8 ft high
Richvale Canal	
Type	Gated outlet
Flow Sensing Method	Flow Tubes
Invert of Gate Opening Elevation	105 feet
Control	3 radial gates, each 6 ft wide by 6 ft high
Sutter-Butte Canal	
Type	Gated outlet
Flow Sensing Method	Overflow Weir
Invert of Gate Opening Elevation	102.75 feet
Control	4 radial gates, each 5 ft wide by 6 ft high

Source: CSWR Bulletin Number 200 – Volume III

Western Canal and Richvale Canal outlets are combined in one structure and located in the northwest corner of Thermalito Afterbay. Western Canal outlet consists of five 96-inch-diameter conduits through the dam. The Richvale Canal outlet parallels these with 72-inch-diameter conduits. Each conduit is equipped with a slide gate at the upstream end to control flow. The Sutter-Butte Canal Outlet is situated on the south side of Thermalito Afterbay. It consists of four 7-foot-wide by 6-foot-high rectangular conduits founded on a concrete base slab, slide gates, a headwall with provisions for bulkheading, training walls, and an outlet channel approximately 1,200 feet long connecting to the existing Sutter-Butte Canal.

The controls for all irrigation outlets were designed to automatically adjust the slide gates to accommodate constantly changing head caused by afterbay fluctuations. Each gate may be operated from any of three control stations as follows: at the gate hoist operator, in the separate outlet control houses, or in the remote control station located in the Oroville Area Control Center at the foot of Oroville Dam.

2.1.10 Transmission Facilities

Two lines of double circuit towers carrying three 230-kV circuits extend from the Hyatt Pumping-Generating Plant 230-kV Switchyard to the Table Mountain Tap. From Table Mountain two lines of double circuit towers carrying three circuits extend to the customers substation and one double circuit line goes to the Thermalito Pumping-Generating Plant 230-kV Switchyard. The distance from the Hyatt Pumping-Generating Plant 230-kV Switchyard and Thermalito Pumping-Generating Plant Switchyard to the Pacific Gas and Electric Company Table Mountain Substation is about nine miles and 2.3 miles, respectively. Also, two underground 15-kV transmission lines, 3.9 miles long and 1.1 miles long connect the Thermalito Diversion Dam Powerplant Switchyard with the upstream Hyatt Pumping-Generating Plant Switchyard and downstream Feather River Fish Hatchery.

2.2 EXISTING ENVIRONMENTAL AND RECREATION COMMITMENTS

2.2.1 Feather River Fish Facilities

2.2.1.1 Fish Barrier Dam

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the Fish Barrier Dam and the Thermalito Afterbay Outlet. The dam diverts fish into a fish ladder that leads to the hatchery.

Table A.2.2-1. Technical Data for Fish Barrier Dam.

Thermalito Afterbay Dam	
Type	Concrete gravity
Volume	9,300 cubic-yards
Height from Base of Dam	91 feet
Crest Elevation	181 feet
Crest Length	600 feet

Source: Lake Oroville Website (Facility Statistics: Feather River Fish Hatchery)

Figure A.2.0-9. The Feather River Fish Barrier Dam

2.2.1.2 Fish Barrier Pool

The Fish Barrier Pool has a storage capacity of 560 acre-feet and covers 50 acres. The shoreline covers one mile at gross capacity.

2.2.1.3 Feather River Fish Hatchery

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the dam and the Thermalito Afterbay Outlet and provides attraction flow for the hatchery. The Feather River Fish Hatchery, an anadromous fish hatchery, was built to compensate for the loss of spawning grounds and rearing areas for returning salmon and steelhead trout and their offspring; the spawning grounds and rearing areas were lost due to

construction of Oroville dam. The hatchery has recently accommodated more than 20,000 adult fish and 15 million young fish annually.

Juvenile salmon and steelhead raised at the hatchery are transported by trucks in oxygenated, temperature-controlled tanks and released in the Feather and Sacramento Rivers, in Lake Oroville and other California reservoirs, and in San Pablo Bay near San Francisco Bay.

The facility is operated by the California Department of Fish and Game (DFG) and maintained by DWR.

Figure A.2.0-10. The Feather River Fish Hatchery

2.2.1.4 Fish Ladder

The Fish Barrier Dam and pool, located upstream of the Feather River Fish Hatchery, divert fish into a fish ladder that leads to the hatchery. The fish ladder consists of a series of “steps” and pools with the maximum drop between pools of one foot.

Underwater passage of fish can be observed by visitors through 42-inch square viewing panels installed in the fish ladder wall.

An enlarged section of the fish ladder at its upstream terminus functions as a gathering tank, entrapping fish ascending the ladder. A mechanical sweep gathers the fish and deposits them into the abutting spawning building. Four concrete circular tanks hold the fish until they are ready to spawn.

Table A.2.2-2. Technical Data for Fish Ladder.

Thermalito Afterbay Dam	
Fish Ladder Length	2,150 feet
Pool Lengths	8 to 1000 feet
Pool Width	6 feet
Pool Depth	2 feet
Velocity	2 to 5 fps

Source: Lake Oroville Website (Facility Statistics: Feather River Fish Hatchery)

2.2.1.5 Hatchery Spawning Building

The Hatchery Spawning Building is where the artificial spawning takes place. Milt is taken from the male and mixed with eggs taken from the female. The eggs are kept in incubators capable of holding up to 25 million eggs.

The fry or young fish are held in incubators until they can be transferred to the rearing channels.

2.2.1.6 Rearing Raceways

Young fish (fingerlings and yearlings) are held in rearing channels until they are ready for release. The rearing channels are concrete-lined raceways blocked off in intervals to form 48 individual pools 100-feet long and 10-feet wide. Water flow and velocity in the raceways are 3 to 5 cfs at 0.1 fps. The raceways are covered with netting to protect the fish from predators such as hawks and herons.

2.2.1.7 Thermalito Fish Rearing Facilities

Located on the west side of the Thermalito Afterbay, the Thermalito Fish Rearing Facility is a set of fish rearing ponds used to raise salmon fry susceptible to the Sacramento River Chinook Disease (a coldwater virus) and young salmon. Its two rearing pond raceways can raise 2.5-million fingerlings for planting in San Pablo Bay or for study purposes.

2.2.1.8 Ultraviolet Water Treatment Facility

The treatment facility at the fish hatchery delivers disinfected water to the Thermalito Fish Rearing Facility and the rearing raceways to guard against the fall-run Chinook becoming diseased.

2.2.2 Recreation Facilities

2.2.2.1 Lake Oroville Visitors Center

Located east of the Oroville Dam on Kelly Ridge, the 10,000 square-foot center features exhibits on the engineering and construction of the hydropower facilities. Additionally, there are interpretive displays on the native culture and the natural resources of the area. The center also has observation decks with various picnic tables and an observation tower. Visitors to Lake Oroville can also obtain specific information about recreational opportunities and activities in the area.

2.2.2.2 Marinas at Bidwell Canyon and Lime Saddle

2.2.2.2.1 Bidwell Canyon Marina

Bidwell Canyon Marina features include a fuel dock, pumping station for boat holding tanks, boat storage, trailer facilities with RV hookups, and a seven-lane boat launching ramp. Bidwell Canyon Marina is located approximately one mile East of Oroville Dam on the southern shore of the lake.

2.2.2.2.2 Lime Saddle Marina

Lime Saddle Marina has a four-lane boat launching ramp, picnic facilities, fishing and boating supplies, gas and oil. The marina is located on the West Branch of the Feather River near Lime Saddle Road.

2.2.2.3 Spillway Recreation Area at Oroville Dam

The Spillway recreation area at Oroville Dam has the largest boat launching facility at Lake Oroville. A 12-lane ramp with over 800 parking spaces, recently renovated in 2002, is used during high water; an eight-lane second-stage ramp is used during low water. This site also provides limited day-use activities and opportunities for picnicking and bike riding.

2.2.2.4 Enterprise Boat Ramp and Day Use Area

The Enterprise ramp and day use area, located on the South Fork arm of Lake Oroville, provides boat launching and shoreline access. This site has a two-lane boat launch ramp used during high water (>820 feet above msl) and limited amenities.

2.2.2.5 Car-Top Boat Launch Ramps

These locations provide access to boaters launching canoes, small sailboats, and other small watercraft.

2.2.2.5.1 Dark Canyon Car-Top Boat Launch Ramp

Dark Canyon Car-Top Boat Launch Ramp is located on the West Branch of the North Fork arm of Lake Oroville. This single-lane boat launch ramp is available at most water levels. There is a paved parking lot but no restroom.

2.2.2.5.2 Foreman Creek Car-Top Boat Launch Ramp

Foreman Creek Car-Top Boat Launch Ramp is located on the north side of the main body of Lake Oroville. This two-lane boat launch ramp provides access at most water levels but has no developed parking area nor restrooms.

2.2.2.5.3 Nelson Bar Car-Top Boat Launch Ramp

Nelson Bar Car-Top Boat Launch Ramp is located on the West Branch of the North Fork arm of Lake Oroville. The lower section of the boat launch ramp, below the improved paved ramp, is passable by foot only. The site has a gravel parking lot, available at all but the highest water levels, and one vault toilet.

2.2.2.5.4 Stringtown Car-Top Boat Launch Ramp

Stringtown Car-Top Boat Launch Ramp is located on the South Fork arm of Lake Oroville. The boat launch ramp is available at most water levels. This site has limited parking and one vault toilet.

2.2.2.5.5 Vinton Gulch Car-Top Boat Launch Ramp

Vinton Gulch Car-Top Boat Launch Ramp is located on the West Branch of the North Fork arm of Lake Oroville. The single-lane boat launch ramp is used at high water. This site has no designated parking area and one vault toilet.

2.2.2.6 Campground and Day Use Areas

2.2.2.6.1 Bidwell Canyon Campground and Day Use Area

Bidwell Canyon Campground is located along the southern shore of Lake Oroville and to the west of Oroville Dam. This facility provides campsites for tents or RV's, the latter with full hookups. This site has flush toilets, piped water, showers, gray water sumps, and a picnic area with fire grills.

2.2.2.6.2 Lime Saddle Campground and Day Use Area

Lime Saddle Campground, built in 2001, is located on the western shoreline of the West Branch of the North Fork arm of Lake Oroville. This facility provides campsites for tents, RV's, and groups. This campground has restrooms, showers, and potable water; each site has a picnic table and fire grill.

2.2.2.6.3 Loafer Creek Campground and Day Use Area

Loafer Creek Campground is the largest campground and is located on the southern shore of Lake Oroville east of Oroville Dam. This facility has campsites for tents, RV's, large groups and has an eight-lane boat launch ramp. The campground is equipped with restrooms, showers, piped water, gray water sumps, picnic table, and fire grills.

Table A.2.2-3. Campground Information.

Campgrounds	Individual Sites	Group Sites
Bidwell Canyon	75	0
Lime Saddle	44	2*
Loafer Creek	137	6

**Each group site at Lime Saddle consists of 3 individual sites.*

2.2.2.7 Boat-in Campgrounds (BIC)

In addition to traditional campgrounds, Lake Oroville provides boat-in campgrounds around the lake. These camps are accessible only by boat and service vehicles and are popular during periods of high water. There are a total of 84 individual/family sites.

2.2.2.7.1 Bloomer Area Boat-in Campground

Bloomer Area Boat-in Campsites are located near the North Fork arm of Lake Oroville. Bloomer Area has four separate camp areas: Bloomer Cove, Bloomer Knoll, Bloomer Point, and Bloomer Group. The Bloomer Group is the only BIC in Bloomer Area that offers a group site (one 75-person group site). Each has campsites equipped with tables and fire rings with cooking grills.

2.2.2.7.2 Craig Saddle Boat-in Campground

Craig Saddle Boat-in Campground is located between the Middle and South arms of Lake Oroville. This area has 18 sites, each equipped with tables, potable water, and fire rings with cooking grills.

2.2.2.7.3 Foreman Creek Boat-in Campground

Foreman Creek Boat-in Campground is located at the north side of Lake Oroville. This site is equipped with potable water, gray water sump, tables, and fire rings with cooking grills.

2.2.2.7.4 Goat Ranch Boat-in Campground

Goat Ranch Boat-in Campground is located on the North Fork arm of Lake Oroville between the Bloomer campgrounds, where the West Branch splits off of the North Fork arm. This site is equipped with tables and fire rings with cooking grills.

Table A.2.2-4. Boat-in Campground Information.

Boat-in Campgrounds	Individual Sites	Toilets
Bloomer Cove BIC	5	2
Bloomer Knoll BIC	6	2
Bloomer Point BIC	24	4
Craig Saddle BIC	18	4
Foreman Creek BIC	26	4
Goat Ranch BIC	5	4

Source: Draft Study Report R-10 and R-10 edited

2.2.2.8 Floating Campsites and Restrooms

Lake Oroville has ten floating campsites that are anchored in different areas of the reservoir. Each is a two-story structure that can accommodate up to 15 people, with living space and amenities such as cooking grill, table, sink, restroom, and sleeping area.

There are seven floating restrooms on Lake Oroville to preserve water quality and provide convenience for boaters. They are stationed around the lake and each has two individual restrooms with vaults that are periodically pumped-out.

2.2.2.9 Diversion Pool Day Use Area

The Diversion Pool Day Use Area is open for day-use activities such as swimming, trail access, and picnicking. Only non-motorized and electric boats are allowed in this area. This site has one vault toilet but few other amenities.

2.2.2.10 North Thermalito Forebay Recreation Area

The North Thermalito Forebay area offers picnicking, swimming, as well as en-route camping. Boating is restricted to non-motorized boats such as sailboats and canoes (electric motors allowed). The boat launch area has two 2-lane boat launch ramps. There are numerous picnic tables, group facilities and shade ramadas, and a popular sand beach.

2.2.2.11 South Thermalito Forebay Recreation Area

The South Thermalito Forebay Recreation Area provides outdoor recreational activities such as boating, picnicking, fishing and swimming. The site has a two-lane boat launch ramp with power boating limited to 330-acres of the 630-acre pool. The site has several picnic tables with fire grills.

2.2.2.12 Monument Hill Day Use Area

Monument Hill Day Use Area provides recreational activities such as boating, swimming, fishing, picnicking and limited hunting. This site has 10 picnic tables, 4 flush toilets, a two-lane boat launching ramp, and a fish cleaning station.

2.2.2.13 Thermalito Afterbay Boat Launch Ramps

2.2.2.13.1 Larkin Road Boat Launch Ramp

The Larkin Road boat launch area has a graded and graveled car-top boat launch ramp. This site has a paved lot approximately 50-yards by 50-yards with a single-vault toilet.

2.2.2.13.2 Monument Hill Boat Launch Ramp

The boat launch ramp consists of a two-lane paved boat launch ramp with a floating dock and is located on the eastern shoreline of the Thermalito Afterbay. The paved and unpaved parking lots are able to accommodate about 75 car/trailer combinations.

2.2.2.13.3 Wilbur Road Boat Launch Ramp

The Wilbur Road boat launch area consists of a two-lane paved boat launch ramp, a parking lot with 14 car/trailer combination spaces and a single portable toilet.

2.2.2.14 OWA Primitive Camping Area

OWA primitive camping is allowed in two designated areas. There are minimal amenities for users. The OWA provides for wildlife habitat and recreational opportunities, including hunting, fishing, nature viewing, camping, biking, horseback riding, picnicking, and boating. Portions of the OWA are managed to provide nesting and foraging cover for resident and migratory waterfowl.

2.2.2.15 Equestrian, Bicycle, and Hiking Trails

2.2.2.15.1 Dan Beebe Trail

The Dan Beebe Trail has both difficult and easy terrain. The Loafer Creek Horse Camp is available for those who plan to spend more than one day riding on the trails. The

horse camp is equipped with shower stalls and feed troughs for the horses. Restroom facilities and trailheads are also located nearby.

2.2.2.15.2 Brad P. Freeman Trail

The 41-mile Brad P. Freeman Trail circles the Thermalito Forebay, Thermalito Afterbay, and the Diversion Pool, and crosses the crest of Oroville Dam. It was constructed in the mid-1990s as a mountain-bicycle trail, but became popular with equestrians and it is now considered a multipurpose trail. There are about a dozen popular or marked access points, many at other popular Project recreation sites, from which trail users can stage. The mostly-unsurfaced trail provides scenic off-road recreation, but some short sections are along paved roads and can be used by less-specialized bicycles. More than 30 miles of the trail are flat but include some rolling terrain; steep grades can be found on either side of Oroville Dam. The Freeman Trail has also been used for downhill and cross-country mountain-bicycle races.

2.2.2.15.3 Hiking Trails

The Freeman Trail provides 41 miles of scenic off-road recreation, popular among riders of all-terrain bikes. The trail circles the Thermalito Forebay, Thermalito Afterbay, and includes the crest of Oroville Dam. About 30 miles of trail are mainly flat but include some rolling terrain; steep grades can be found on either side of the dam within a two mile distance from Lake Oroville. A portion of the bike trail is paved and the rest is either dirt or gravel.

2.2.3 Oroville Wildlife Area

2.2.3.1 Introduction

The OWA comprises approximately 11,000- acres west of Oroville that is managed for wildlife habitat, recreational activities and gravel mining. It includes the Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The 5,000 acre area straddles 12 miles of the Feather River, which includes willow and cottonwood lined ponds, islands, and channels. Recreation areas include dispersed recreation (hunting, fishing, hiking, and bird watching), plus recreation at developed sites, including Monument Hill day use area, model airplane grounds, three developed boat launches on the Afterbay and two unimproved ramps on the river, and two primitive camping areas. California Department of Fish and Game's (DFG) habitat enhancement program includes a wood duck nest-box program and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a number of locations.

2.2.3.2 Habitat Activity Areas

The DFG is responsible for operation and maintenance of the OWA. A significant amount of their activity is taken up with garbage collection throughout the area.

However, several significant efforts have been undertaken to enhance the vegetation communities and wildlife habitat.

2.2.3.2.1 Brood Ponds

DWR and the California Waterfowl Association (CWA) in consultation with DFG worked to establish five brood ponds for waterfowl within the Thermalito Afterbay. Due to the changing water elevation, waterfowl were having a difficult time establishing nests and hatching offspring. It was decided to establish small, dammed areas in shallow end bays throughout the Afterbay. When the water of the Afterbay started to drop or rise, the shoreline within the brood pond areas would remain more stable thereby allowing nesting waterfowl the opportunity to continue without being inundated by water. Ongoing maintenance activities include thinning/removal of vegetation to provide better access to water areas and the construction/installation of wood duck boxes. This habitat management activity has been very successful and resulted in significant numbers of waterfowl within the Afterbay and adjacent lands.

2.2.3.2.2 Habitat Enhancement

DFG conducts habitat enhancement programs throughout the entire OWA. However, most of this activity consists of planting nesting and foraging vegetation cover for waterfowl, 85 percent of which is in and around Thermalito Afterbay.

2.2.3.3 Recreation Activity Areas

The Thermalito Afterbay and preserve are heavily used by the public for hunting, fishing, and recreation. These activities are described below.

2.2.3.3.1 Camping

Currently, there are three camping locations in the OWA. There are two improved campgrounds next to the Thermalito Afterbay Outlet (southeast corner of the Afterbay). These locations include vault restrooms, picnic tables, and trash receptacles. A dirt boat ramp in the northern campground provides access to the Feather River. One other unimproved campground is located on the northwest end of One Mile Pond (near the southern end of the preserve).

2.2.3.3.2 Boating Facilities

Two improved and one semi-improved boat ramps are provided for powerboat and watercraft access to the Thermalito Afterbay. The improved boat ramps include Monument Hill (east side of the Afterbay) and Wilber Road just off Highway 162 in the northeast corner of Thermalito Afterbay. The Larkin Road location is a semi-improved boat ramp in the southeast section of Thermalito Afterbay. There is also a semi-improved boat ramp that provides access to the Feather River adjacent (north) to Thermalito Afterbay Outlet. The Monument Hill location also includes several improvements such as a paved parking lot, picnic tables, barbecue pits, and vault toilets.

2.2.3.3.3 Boating and Water Skiing

The three improved boat ramps provide public access for boating and water skiing recreational activities on the Thermalito Afterbay. A water ski slalom course was installed in the southeastern corner of the Afterbay. The area is heavily used by water ski boats, pleasure and fishing boats, and personal watercraft (jet skies). Sailboarding is also a popular activity.

2.2.3.3.4 Picnicking

Facilities for picnicking activities are limited to those located at Monument Hill located on the east side of Thermalito Afterbay. The area includes several picnic tables with permanent barbecue facilities, a paved boat ramp, parking facilities, and vault toilets.

2.2.3.3.5 Hunting

Hunting is one of the primary activities at the OWA and involves bird and mammal hunting, as permitted according to the hunting season. Only shotguns or bows and arrows are allowed in the OWA. Rifles and pistols are not allowed for hunting in the OWA. There are approximately 150,000 to 200,000 user days per year at the OWA related to both hunting and fishing. There are diverse hunting seasons throughout the year that include the following primary animals of interest:

Table A.2.2-5. Hunting Information.

Animal Species	Hunting Season
Deer by archery	The season opens on the third Saturday in August and extends for 23 consecutive days.
Deer by shotgun	The season opens on the fourth Saturday in September and extends for 37 consecutive days.
Dove	September 1-15 and from the second Saturday in November extending for an additional 45 days (November 9 – December 23, 2002)
Quail	The season opens on the third Saturday in August extending for 21 consecutive days (August 17 – September 6, 2002) and the third Saturday in October extending through the last Sunday in January (October 19, 2002 – January 26, 2003)
Water fowl	The season opens on the second Saturday in October and runs through third Sunday in January.
Goose	The season opens on the Saturday closet to November 2 and runs through the last Sunday in January.
Pheasant	9th of November through December 22.
Turkey – spring	Last Saturday in March extending for 37 consecutive days by special permit only.

In addition to the scheduled hunting seasons, the DFG sponsors two/year, junior (kids under 16) pheasant hunts with stocked birds.

2.2.3.3.6 Fishing

Fishing at the OWA provides some of the best opportunities within the State of California. Fish in the Feather River include anadromous species such as: Chinook salmon, steelhead, shad, stripped bass, and sturgeon. Salmon and steelhead fishing is best in fall and winter; shad and striped bass seasons peak in late spring. Anglers can also fish for largemouth and smallmouth bass, bluegill, crappie, brown bullhead, and carp. The Afterbay and dredger ponds throughout the area include bass, blue gill, cat fish, and crappie. In years past, the DFG stocked fish in the dredger ponds but no longer continues that activity.

2.2.3.3.7 Bird Watching

The OWA provides many opportunities for bird watching and has been designated as a "significant bird area" by the Audubon Society. It provides a year-round home for at least 128 species of birds and 12 species of mammals. Common game birds include mourning dove, California quail, ring-necked pheasant, and migrating flocks of band-tailed pigeons. Bird and nature study is excellent during the spring.

2.2.3.4 Gravel Mining

DWR maintains numerous contracts with local companies for the mining and use of gravel within the preserve portion (southern half) of the OWA. These areas are all located within the flood plain of the Feather River and provide significant gravel resources for projects throughout the surrounding county.

3.0 DESCRIPTION OF PROPOSED NEW FACILITIES

This section is to be completed based on studies and Resource Action Evaluations.

4.0 LANDS OF THE UNITED STATES

The Federal lands within the Lake Oroville project boundary include a total of 6,175 acres of land owned by the Bureau of Land Management (BLM) and the U.S. Forest Service (USFS). The BLM lands total 4,603 acres and the USFS lands total 1,572 acres.

5.0 REFERENCES

DWR (California Department of Water Resources). 2001. Initial information package, relicensing of the Oroville Facilities. Federal Energy Regulatory Commission License Project No. 2100. Sacramento, CA. January 2001.

DWR (California Department of Water Resources). SP-R10 Recreation Facility and Condition Inventory

DWR (California Department of Water Resources). Management of the State Water Project. DWR Bulletin Number 200 Volume III. Sacramento, CA November 1974.

Lake Oroville Website (Facility Statistics: Feather River Fish Hatchery) http://www.lakeoroville.water.ca.gov/stats_feather.html

DWR-NEPA Scoping Document 2 and Amended CEQA Notice of Preparation. Oroville Facilities Relicensing-FERC Project 2100-Febuary 25, 2003.

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State of California
The Resources Agency
Department of Water Resources

DRAFT
EXHIBIT B – PROJECT OPERATION AND RESOURCE UTILIZATION

Oroville Division, State Water Facilities
FERC Project No. 2100

APRIL 30, 2004

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Department of Water Resources

State of California
The Resources Agency
Department of Water Resources

EXHIBIT B – PROJECT OPERATION AND RESOURCE UTILIZATION

Oroville Division, State Water Facilities
FERC Project No. 2100

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TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

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1.0 GENERAL PROJECT DESCRIPTION

1.1 OVERVIEW

The Oroville Facilities (FERC Project No. 2100) were developed as part of the State Water Project (SWP), a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose of the SWP is to store and distribute water to supplement the needs of urban and agricultural water users in northern California, the San Francisco Bay area, the San Joaquin Valley, and southern California. The Oroville Facilities are also operated for flood management, power generation, water quality improvement in the Delta, and recreation and fish and wildlife enhancement.

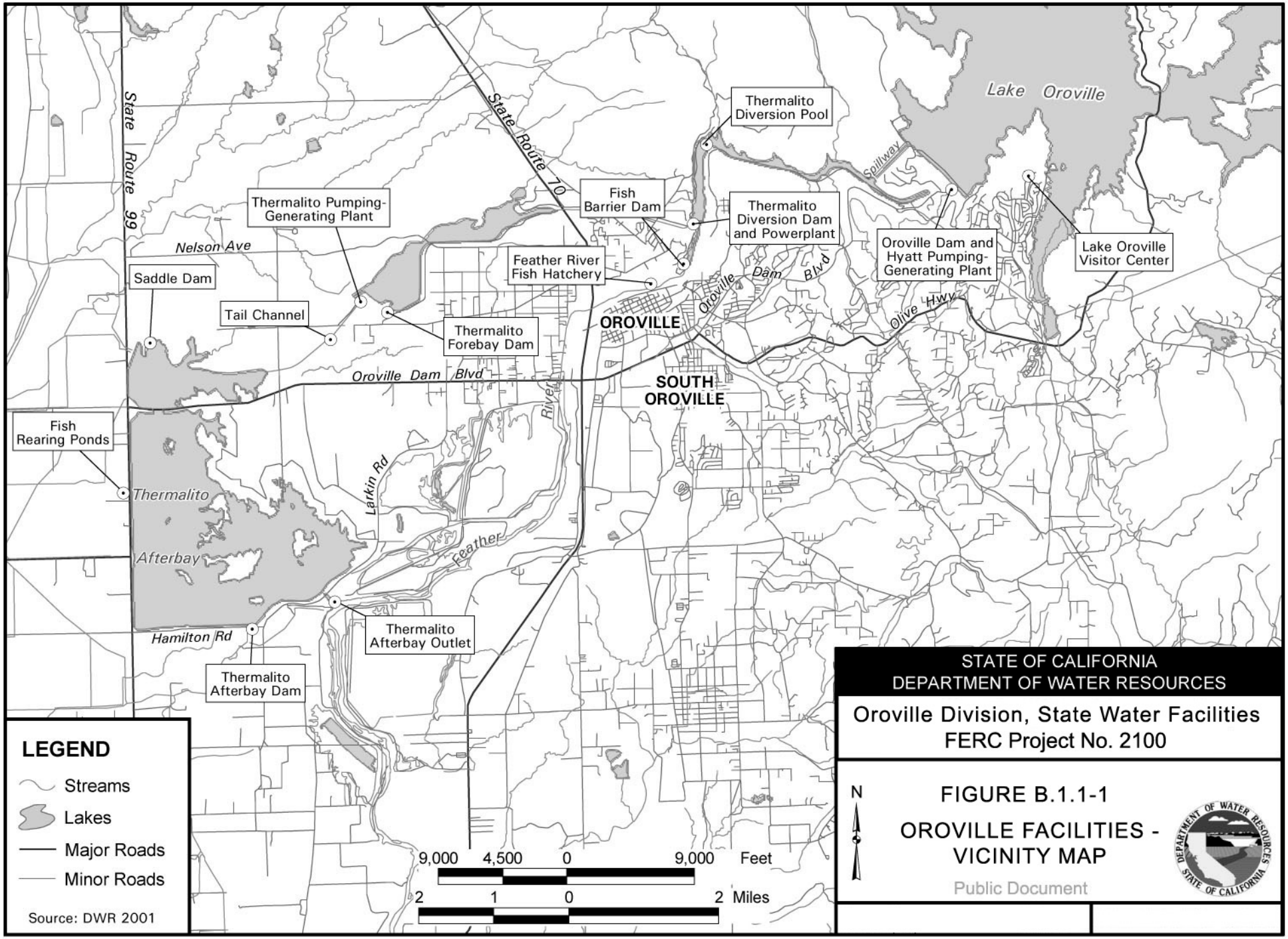
FERC Project No. 2100 encompasses 41,100 acres and includes Oroville Dam and Reservoir, three power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Powerplant, and Thermalito Pumping-Generating Plant), Thermalito Diversion Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal, Oroville Wildlife Area (OWA), Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, and transmission lines, as well as a number of recreational facilities. An overview of these facilities is provided on Figure B.1.1-1. The Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5-million-acre-feet (maf) capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level.

1.2 EXISTING POWER FACILITIES

The hydroelectric facilities have a combined license generating capacity of approximately 762 megawatts (MW). The Hyatt Pumping-Generating Plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels into the Feather River just downstream of Oroville Dam. The plant has a generating and pumping flow capacity of 16,950 cfs and 5,610 cfs, respectively. Other generation facilities include the 3 MW Thermalito Diversion Dam Powerplant and the 114 MW Thermalito Pumping-Generating Plant.

Thermalito Diversion Dam, four miles downstream of the Oroville Dam creates a tail water pool for the Hyatt Pumping-Generating Plant and is used to divert water to the Thermalito Power Canal. The Thermalito Diversion Dam Powerplant is a 3 MW power plant located on the left abutment of the Diversion Dam. The power plant releases a maximum of 615 cubic feet per second (cfs) of water into the river.

The Thermalito Power Canal is a 10,000-foot-long channel designed to convey generating flows of 16,900 cfs to the Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. The Thermalito Forebay is an off-stream regulating reservoir for the 114 MW Thermalito Pumping-Generating Plant.


Lake Oroville
Thermalito Diversion Pool
Spillway
State Route 70
State Route 99
Thermalito Pumping-Generating Plant
Fish Barrier Dam
Thermalito Diversion Dam and Powerplant
Oroville Dam and Hyatt Pumping-Generating Plant
Lake Oroville Visitor Center
Nelson Ave
Saddle Dam
Feather River Fish Hatchery
Oroville Dam Blvd
Olive Hwy
Tail Channel
Thermalito Forebay Dam
OROVILLE
SOUTH OROVILLE
Oroville Dam Blvd
Fish Rearing Ponds
Thermalito Afterbay
Larkin Rd
Feather River
Hamilton Rd
Thermalito Afterbay Outlet
Thermalito Afterbay Dam
LEGEND
Streams
Lakes
Major Roads
Minor Roads
Source: DWR 2001
9,000 4,500 0 9,000 Feet
2 1 0 2 Miles
N
STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
Oroville Division, State Water Facilities
FERC Project No. 2100
FIGURE B.1.1-1
OROVILLE FACILITIES - VICINITY MAP
Public Document
DEPARTMENT OF WATER RESOURCES
STATE OF CALIFORNIA

The Thermalito Pumping-Generating Plant is designed to operate in tandem with the Hyatt Pumping-Generating Plant and has generating and pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into the Thermalito Afterbay, which is contained by a 42,000-foot-long earth-fill dam. Thermalito Afterbay is used to release water into the Feather River downstream of the Oroville Facilities, helps regulate the power system, provides storage for pump-back operations, and provides recreational opportunities. Several local irrigation districts receive water from Thermalito Afterbay.

1.3 EXISTING ENVIRONMENTAL AND RECREATION COMMITMENTS

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the dam and the Thermalito Afterbay Outlet and provides attraction flow for the hatchery. The Feather River Fish Hatchery, an anadromous fish hatchery, was built to compensate for the loss of spawning grounds and rearing areas for returning salmon and steelhead trout and their offspring; the spawning grounds and rearing areas were lost due to construction of Oroville Dam. The hatchery has recently accommodated more than 20,000 adult fish and 15 million young fish annually.

The Oroville Facilities support a wide variety of recreational opportunities. These opportunities include: boating (several types), fishing (several types), fully developed and primitive camping (including boat-in and floating sites), picnicking, swimming, horseback riding, hiking, off-road bicycle riding, wildlife watching, and hunting. There are also visitor information sites with cultural and informational displays about the developed facilities and the natural environment. There are major recreation facilities at Loafer Creek, Bidwell Canyon, Spillway, North and South Thermalito Forebay, and Lime Saddle. Lake Oroville has two full-service marinas, five car-top boat launch ramps, ten floating campsites, and seven dispersed floating toilets. There are also recreation facilities at the Visitor Center and the OWA.

The OWA comprises approximately 11,000-acres west of Oroville that is managed for wildlife habitat and recreational activities. It includes the Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The 5,000-acre area straddles 12 miles of the Feather River, which includes willow and cottonwood-bordered ponds, islands, and channels. Recreation areas include dispersed recreation (hunting, fishing, and bird watching), plus recreation at developed sites, including Monument Hill Day Use Area, model airplane grounds, three boat launches on Thermalito Afterbay and two on the river, and two primitive camping areas. California Department of Fish and Game's (DFG) habitat enhancement program includes a wood duck nest-box program and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a number of locations.

2.0 PROJECT OPERATIONS

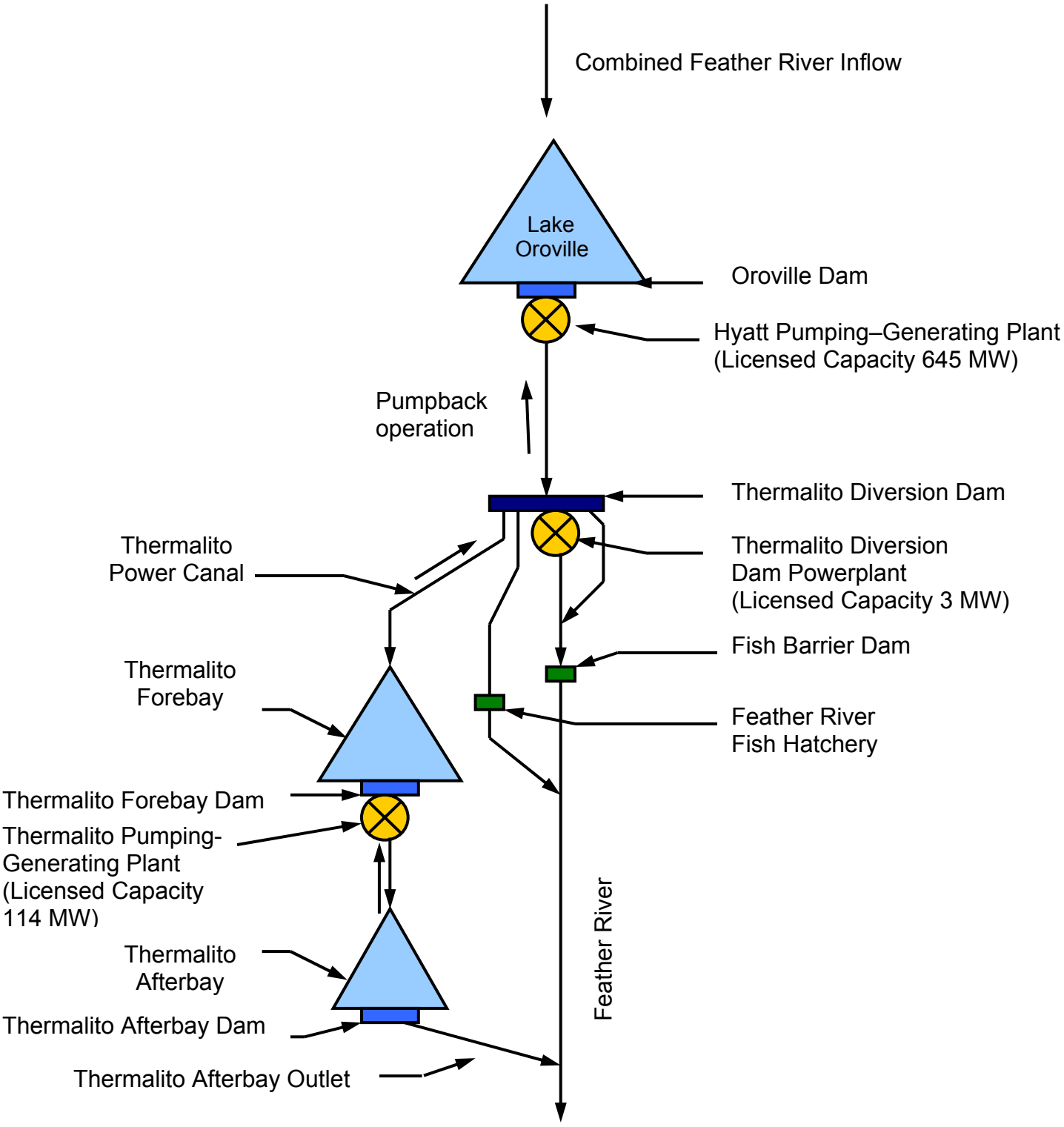
The licensed Oroville Facilities must operate within the constraints imposed by the much larger SWP, its complex operating rules, and existing Environmental Commitments. The SWP was authorized by the State Legislature in 1951 to "store runoff in Northern California and deliver to areas of need throughout the State." The SWP is a complex water storage and delivery system, involving 28 dams and reservoirs, 8 hydroelectric power plants (3 of which are pumping-generating plants), 17 pumping plants, and more than 600 miles of pipelines and aqueducts. The SWP is a multipurpose water project, responsible for water supply, flood management, power generation, recreation, and habitat enhancement for fish and wildlife. Notwithstanding its multipurpose nature, the top priorities are water supply and flood control, and power generation is secondary. Water releases from various SWP reservoirs and diversion dams are dictated and controlled by essentially all authorized project purposes. The SWP has conveyed an average annual 2.4 maf of water to the 29 long-term water contractors.

2.1 EXISTING OPERATIONS

Figure B.2.1-1 contains a flow diagram that illustrates the overall Oroville Facilities configuration and primary water storage and release points.

Lake Oroville stores and releases water that flows into the lake from upstream reservoir releases and runoff from the intervening area between Lake Oroville and the upper storage reservoirs. Water is released from Lake Oroville to the Feather River to meet water supply, flood protection, water quality improvement, fish and wildlife enhancement, and recreation requirements. Typically, power is generated when water is released from Lake Oroville through the Oroville Facilities for these purposes, or when the pumped-storage operations at the Hyatt and Thermalito plants are in effect.

Planning and implementing SWP operations is highly dependent on constraints placed upon the Oroville Facilities. The Oroville Facilities' operational planning is performed by the Operations Control Office (OCO). The day-to-day operation of the Oroville Facilities is done through the Oroville Field Division (OFD). Decision-making for SWP operations begins with an overall long range plan for the year. This long-range plan is used to establish general operational objectives and to assess the likelihood of achieving the operational objectives. Operations plans are developed on a weekly basis to meet the overall annual operational objectives. Daily schedules are subsequently developed to meet the weekly operational objectives and are adjusted in real-time as needed to respond to changes in conditions.



Source: PDEA Section 3

Figure B.2.1-1. Oroville Facilities Flow Diagram.

2.1.1 Reservoir Operation

DWR stores winter and spring runoff in Lake Oroville for release to the Feather River, as necessary, to meet downstream demands. Annual operations planning is conducted for multiyear carryover, in which half the Lake Oroville storage above the minimum pool is assumed available for subsequent years. The operations plan is updated regularly to reflect changes in hydrology and downstream operations. Typically, Lake Oroville is filled to its maximum annual level of 900 ft. mean sea level (msl) in June and then can be lowered as necessary to meet downstream requirements, to its minimum level in December or January. During and following dry years, the lake may be drawn down more and may not fill to desired levels the following spring. During 1991, 1992, and 1993, (1991 and 1992 were dry years), the minimum elevations were 651 ft., 702 ft., and 723 ft., respectively. During wetter hydrologic conditions, Lake Oroville is managed to control downstream flooding. The U.S. Army Corps of Engineers (USACE) requires Lake Oroville to be operated to maintain up to 750,000 acre-ft. of storage space to capture significant inflows for flood control. Historically, the maximum flood flows released from Lake Oroville were about 160,000 cfs in 1997.

Figure B.2.1-2 below shows average daily lake levels for selected years, illustrating the above operation.

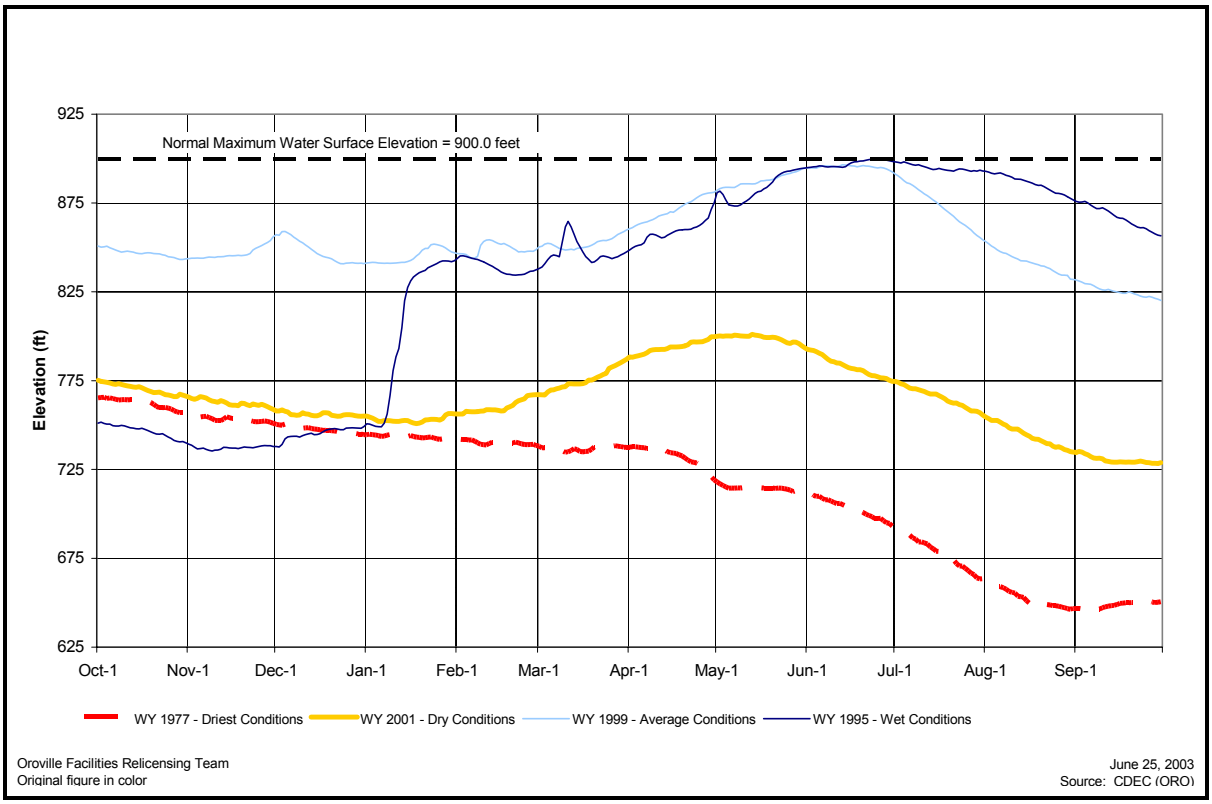


Figure B.2.1-2. Lake Oroville daily elevations.

Figure B.2.1-3 shows Lake Oroville water levels for dry, average, and wet water years. As seen in the figure, the curve showing actual operations generally follows the shape of the flood control rule curve with:

- Lower levels in the late winter and early spring for flood control purposes;
- Higher levels in the late spring and early summer when higher flows may be captured without impacting flood protection; and
- Declining levels in the late summer and fall as the stored water is used.

Actual storage may encroach into the flood reservation during flood events to prevent or minimize downstream flooding along the Feather River. Table B2.1-1 lists the maximum flow targets at various locations along the Feather River.

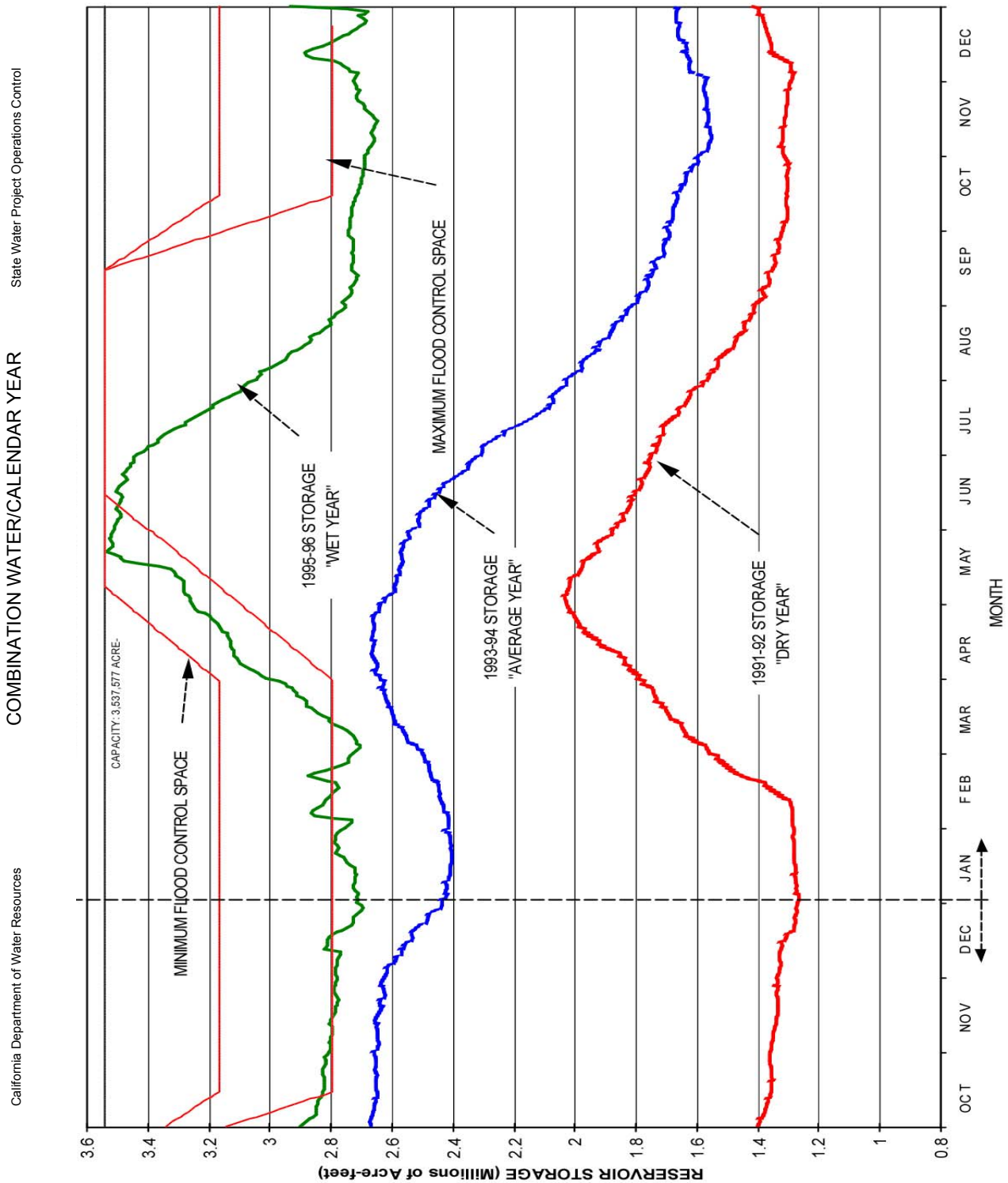
Table B.2.1-1. Maximum Feather River Flow Targets.

Location	Max. Allowable Flow
Below Lake Oroville	150,000 cfs
Above Yuba River	180,000 cfs
Below Yuba River	300,000 cfs
Below Bear River	320,000 cfs

Source: Initial Information Package and Memo from Maurice Roos to Lori Brown dated 7/18/03.

2.1.2 Annual Water Operations Planning

Operations planning requires coordination with other Federal, State, and local agencies, and must consider a number of factors. The OCO develops an annual water operations plan that considers forecasted water supply, projected operations of the Central Valley Project, and regulatory (flood management, instream requirements, and water quality) and contractual obligations. This first official plan for the next year is completed in early December as part of the allocation process and is a significant component in determining the amount of forecasted deliveries to State Water Contractors. This monthly time-step plan includes projected release to the Feather River, forecasts of Oroville inflow, Lake Oroville end-of-month storage levels, and local demands. The water operations plan is updated and reissued each month through April to reflect changes in hydrology and downstream operations. The Oroville Facilities power plants operate within the constraints established by the water operations plan.



Source: DWR – Operations Control Office

Figure B.2.1-3. Lake Oroville water levels for dry, average, and wet water years.

2.1.3 Weekly Water Operations Planning

Each week, the OCO develops a general plan for reservoir releases. This plan considers how much water will be needed downstream for: (1) local water supply demands; (2) Delta water quality and quantity requirements; (3) instream flow and temperature requirements; (4) SWP pumping requirements in the Delta; and (5) minimum flood management storage space. The weekly plan is revised as needed to meet changing operational conditions both upstream and downstream.

2.1.4 Daily Water Operations Scheduling

Hourly water releases through the power plants are scheduled daily. The hourly operation of the power plants is planned to maximize the amount of energy that may be produced during periods when electrical demand is highest. Additionally, ancillary services required for participation in the electric utility market and bid into the California Independent System Operator (CAISO) are scheduled on an hourly basis. These ancillary services include regulation up and down, spinning reserves, standby reserves, supplemental energy market, and voltage regulation. The hourly schedule is scheduled to maximize power benefits as long as Oroville Facilities operations fit within the constraints of the overall daily Feather River release objective downstream of Thermalito Afterbay.

2.1.4.1 Releases

Releases from Lake Oroville are scheduled on a weekly basis to accommodate (1) water supply, quality, and quantity requirements in the Sacramento-San Joaquin Delta, (2) instream flow requirements in the Feather River, and (3) minimum flood control space. Weekly operational plans are updated as needed to respond to changing conditions. The Thermalito Diversion Dam Pool and the Thermalito Forebay and Afterbay are too small for seasonal storage so they are used only in weekly and daily operations planning. Releases through the Hyatt and Thermalito Pumping-Generating Plants are scheduled on an hourly basis to maximize the amount of energy produced when power values are highest. Because the downstream water supply is not dependent on hourly releases, and pumping of SWP water can be scheduled at off-peak times, hourly operational decisions are impacted by the following considerations:

- Electrical energy prices and ancillary service requirements such as spinning reserve;
- Supplemental energy market activities; and
- Voltage regulation requirements.

Storage in the Thermalito Forebay and Afterbay is used to generate power and maintain uniform flows in the Feather River downstream of the Oroville Facilities. Thermalito Afterbay also provides storage for pump-back operations. The pump-back operations

are designed to use water that is in excess of what is required for downstream flow requirements for pumping back into the Thermalito Forebay and then into Lake Oroville during off-peak hours. This water is then released again during on-peak hours when power values increase. Generation provided by this pumpback activity contributes on average only about six or seven percent to the total annual Oroville Facilities generation. Because the two main power plants are operated to take advantage of weekday generation when power values are highest, there is usually higher storage in the Afterbay by the end of the week. This is illustrated in Figures B.2.1-4 and B.2.1-5 below. During the weekend, water from the Afterbay continues to be released to the Feather River, generation at the Hyatt and Thermalito Pumping-Generating Plants is decreased, and pump-back operations into Lake Oroville may occur. By the end of the weekend, the elevation of the Afterbay is lowered to prepare for a similar operation the following week.

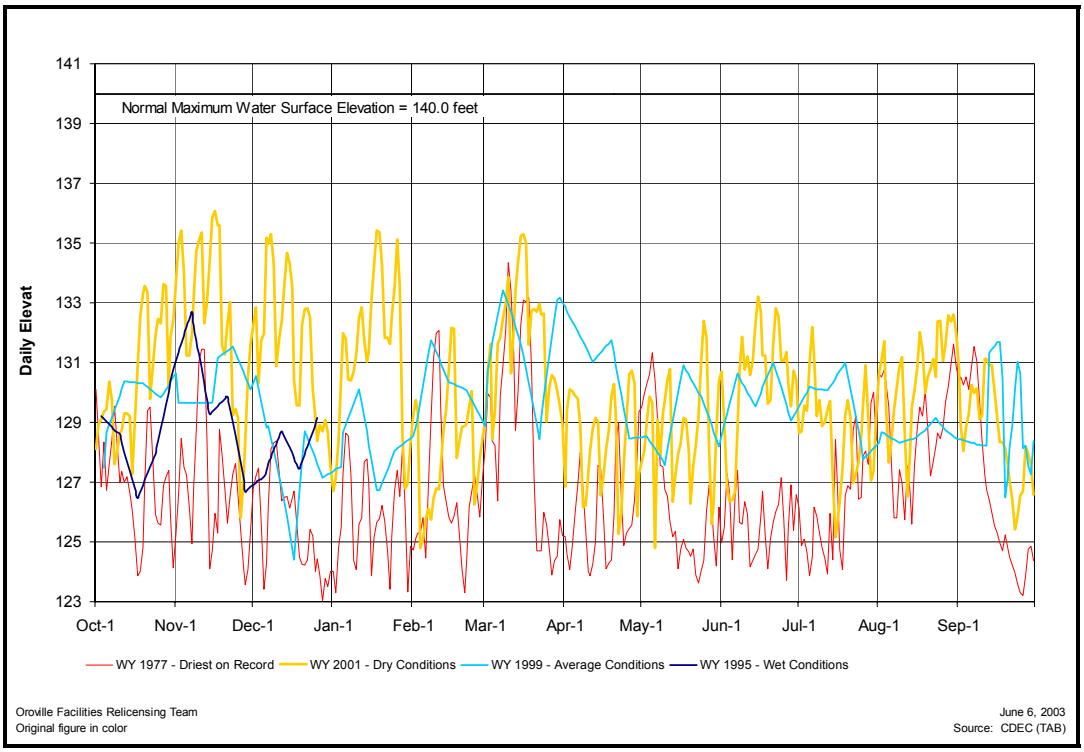


Figure B.2.1-4. Thermalito Afterbay daily elevations.

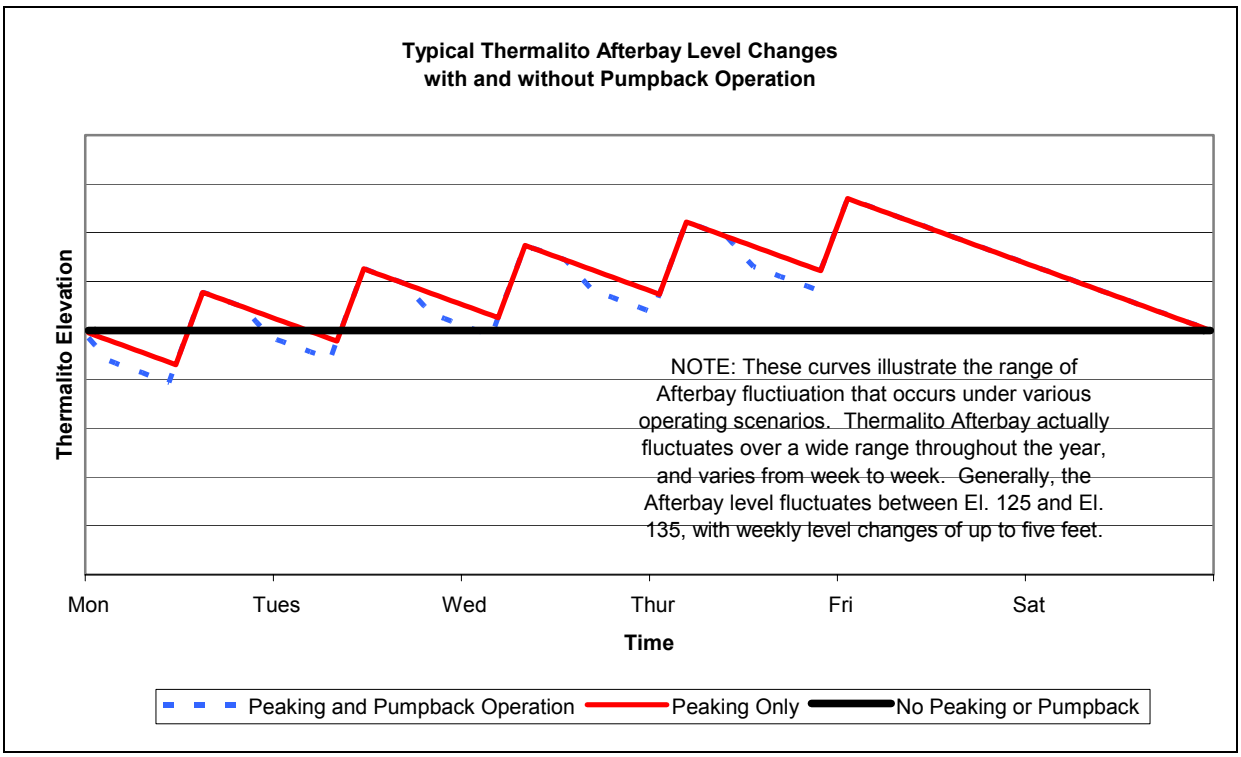


Figure B.2.1-5. Thermalito Afterbay daily reservoir elevations - first full week in April (Monday – Friday). Additional charts/graphs will be prepared to illustrate historical operating levels, and that info will be included in the 1/2005 Application.

2.1.4.2 Agricultural Diversions

Monthly agricultural diversions of up to 190,000 af (July 2002) are made from Thermalito Afterbay and the Feather River during the May through August irrigation season. Total annual entitlement of the Butte and Sutter County agricultural users is approximately 1 maf. After meeting these local demands, flows into the lower Feather River continue into the Sacramento River and into the Sacramento-San Joaquin Delta. In the northwestern portion of the Delta, water is pumped into the North Bay Aqueduct. In the south Delta, water is diverted into Clifton Court Forebay where the water is stored until it is pumped into the California Aqueduct.

2.1.4.3 Flood Management

The Oroville Facilities are an integral component of the flood management system for the areas along the Feather and Sacramento Rivers downstream of Oroville Dam. During the wintertime, the Oroville Facilities are operated under flood control requirements specified by the U.S. Army Corps of Engineers (USACE). Under these requirements, Lake Oroville is operated to maintain up to 750,000 af of storage space to allow for the capture of significant inflows. Flood control releases are based on the

release schedule in the flood control diagram or the emergency spillway release diagram prepared by the USACE, whichever requires the greater release. Decisions regarding such releases are made in consultation with the USACE.

The flood control requirements are designed for multiple use of reservoir space. During times when flood management space is not required to accomplish flood management objectives, the reservoir space can be used for storing water. From October through March, the maximum allowable storage limit (point at which specific flood release would have to be made) varies from about 2.8 to 3.2 maf to ensure adequate space in Lake Oroville to handle flood flows. The actual encroachment demarcation is based on a wetness index, computed from accumulated basin precipitation. This allows higher levels in the reservoir when the prevailing hydrology is dry while maintaining adequate flood protection. When the wetness index is high in the basin (i.e., wetness in the watershed above Lake Oroville), the flood management space required is at its greatest amount to provide the necessary flood protection. From April through June, the maximum allowable storage limit is increased as the flooding potential decreases, which allows capture of the higher spring flows for use later in the year. During September, the maximum allowable storage decreases again to prepare for the next flood season. During flood events, actual storage may encroach into the flood reservation zone to prevent or minimize downstream flooding along the Feather River.

Table B.2.1-2 presents the significant spills of record. During the largest flood record in early 1997, the estimated peak downstream release was 160,000 cfs for a short time, much less than the peak storm inflow of 302,000 cfs. In the large February 1986 flood, peak inflow to Lake Oroville was estimated to be about 266,000 cfs, and maximum complex releases were 150,000 cfs. Most of these releases came through the dam spillway but some were made via the Hyatt Pumping-Generating Plant. As spillway amounts increase over 60,000 cfs, the local backwater effect begins to limit powerplant production. The spillway volume releases shown in the table do not include flow through the plant. However, the maximum release is the total release to the river, including flows from Thermalito Afterbay Outlet. The maximum river release will usually lag the peak bi-hourly inflow because the initial flood surge is stored in Lake Oroville and downstream release increases are limited by the Corps of Engineers to not exceed increments of 10,000 cfs every two hours.

Table B.2.1-2. Significant spills of record.

Spill Begin	Period End	Maximum. Release in cfs	Total Release in AF	Maximum Inflow in cfs
1-13-70	2-02-70	77,000	1,563,000	147,000
1-12-80	1-20-80	85,000	726,000	155,000
2-15-86	3-01-86	150,000	1,420,000	266,000
3-09-95	3-27-95	87,000	1,235,000	141,000
12-27-96	1-17-97	160,000	2,013,000	302,000

Source: Memo from Maurice Roos to Lori Brown dated 7/18/03.

Note: Most of the spills shown in the table occurred over the Oroville Dam Spillway, but some releases were made through the Hyatt Pumping-Generating Plant. The spill flows do not include maximum releases through Hyatt Pumping-Generating Plant of up to 16,950 cfs.

2.2 EXISTING ENVIRONMENTAL AND RECREATION COMMITMENTS

Operation of the Oroville Facilities varies seasonally, weekly and hourly, depending on hydrology and the operational objectives DWR is trying to meet. Typically, releases to the Feather River are managed to conserve water while meeting a variety of water delivery requirements, including upstream and downstream flows, temperature, fisheries, recreation, agricultural diversions and water quality. Lake Oroville stores winter and spring runoff for release to the Feather River as necessary for project purposes. Meeting the water supply objectives of the SWP has always been the primary consideration for determining Oroville Facilities' operations (within the regulatory constraints specified for flood control, in-stream fisheries, and downstream uses). Power production is scheduled within the boundaries specified by the water operations criteria noted above. Annual operations planning is conducted for multi-year carry over. The current methodology is to retain half of Lake Oroville's storage above a specific level for subsequent years. Currently, that level has been established at 1,000,000 acre-feet (af); however, this does not limit draw down of the reservoir below that level. If hydrologic data show it to be a drier year than expected or operational requirements are greater than expected, additional water would be released from Lake Oroville. The operations plan is updated regularly to reflect changes in hydrology and downstream requirements. Typically, Lake Oroville is filled to its maximum annual level of up to 900 feet above mean sea level (msl) in June and then can be lowered as necessary to meet downstream requirements, to its minimum level in December or January. During drier years, the lake may be drawn down more and may not fill to the desired levels the following spring. Oroville Facilities operations are directly constrained by downstream environmental and flood management criteria as described below.

2.2.1 Fish and Wildlife Management

An August 1983 agreement between DWR and DFG entitled, "Agreement Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish & Wildlife," sets criteria and objectives for flow and temperatures in the low flow channel and the reach of the Feather River between Thermalito Afterbay and Verona. This agreement: (1) establishes minimum flows between Thermalito Afterbay Outlet and Verona which vary by water year type; (2) requires flow changes under 2,500 cfs to be reduced by no more than 200 cfs during any 24-hour period, except for flood management, failures, etc.; (3) requires flow stability during the peak of the fall-run Chinook spawning season; and (4) sets an objective of suitable temperature conditions during the fall months for salmon and during the later spring/summer for shad and striped bass.

2.2.1.1 Instream Flow Requirements

The Oroville Facilities are operated to meet minimum flows in the Lower Feather River as established by the 1983 agreement (see above). The agreement specifies that Oroville Facilities release a minimum of 600 cfs into the Feather River from the Thermalito Diversion Dam for fisheries purposes. This is the total volume of flows from the Thermalito Diversion Dam Powerplant, and the Feather River Fish Hatchery pipeline.

Generally, the instream flow requirements below Thermalito Afterbay are 1,700 cfs from October through March, and 1,000 cfs from April through September. However, if runoff for the previous April through July period is less than 1,942,000 af (i.e., the 1911-1960 mean unimpaired runoff near Oroville), the minimum flow can be reduced to 1,200 cfs from October to February, and 1,000 cfs for March. A maximum flow of 2,500 cfs is maintained from October 15 through November 30 to prevent spawning in overbank areas that might become de-watered.

2.2.1.2 Feather River Temperature Requirements

The Thermalito Diversion Pool provides the water supply for the Feather River Fish Hatchery. The hatchery objectives are 52°F for September, 51°F for October and November, 55°F for December through March, 51°F for April through May 15, 55°F for the last half of May, 56°F for June 1-15, 60°F for June 16 through August 15, and 58°F for August 16-31. A temperature range of plus or minus 4°F is allowed for objectives, April through November.

There are several temperature objectives for the Feather River downstream of the Thermalito Afterbay Outlet. During the fall months, after September 15, the temperatures must be suitable for fall-run Chinook. From May through August, they must be suitable for shad, striped bass, and other warm water fish.

The National Oceanic and Atmospheric Administrations (NOAA) Fisheries (formerly National Marine Fisheries Service) has also established an explicit criterion for steelhead trout and spring-run Chinook salmon. Memorialized in a biological opinion on the effects of the Central Valley Project and SWP on Central Valley spring-run Chinook and steelhead as a reasonable and prudent measure; DWR is required to control water temperature at Feather River mile 61.6 (Robinson's Riffle in the low-flow channel) from June 1 through September 30. This measure requires water temperatures less than or equal to 65°F on a daily average. The requirement is not intended to preclude pump-back operations at the Oroville Facilities needed to assist the State of California with supplying energy during periods when the California ISO anticipates a Stage 2 or higher alert.

The hatchery and river water temperature objectives sometimes conflict with temperatures desired by agricultural diverters. Under existing agreements, DWR provides water for the Feather River Service Area (FRSA) contractors. The contractors desire warmer water during spring and summer for rice germination and growth (i.e., 65°F from approximately April through mid May, and 59°F during the remainder of the growing season). To the extent practical, DWR does use its operational flexibility to accommodate the FRSA contractor's temperature goals.

2.2.2 Sacramento-San Joaquin Delta Water Quality Control

Flows through the Delta are maintained to meet Bay-Delta water quality standards arising from DWR's water rights permits. These standards are designed to meet several water quality objectives such as salinity, Delta outflow, river flows, and export limits. The purpose of these objectives is to attain the highest water quality, which is reasonable, considering all demands being made on the Bay-Delta waters. In particular, they protect a wide range of fish and wildlife including Chinook salmon, Delta smelt, striped bass, and the habitat of estuarine-dependent species.

2.2.3 Fish Hatchery Operations

Water is also released from the Oroville Facilities storage reservoirs to support fish hatchery operations downstream of the Fish Barrier Dam. The design of the facilities provides for significant flexibility to enable water temperature control as described below. Fish hatchery temperature objectives are listed in Table B.2.1-3.

Table B.2.1-3. Fish hatchery water temperature objectives.

Period	Temperature (+/- 4°F)
April 1 – May 15	51°
May 16 – May 31	55°
June 1 – June 15	56°
June 16 – August 15	60°
August 16 – August 31	58°
September 1 – September 30	52°
October 1 – November 30	51°
December 1 – March 31	55°

Hyatt Pumping-Generating Plant Operations - Temperature Control

- Water temperature of releases from Lake Oroville can be regulated to meet water temperature objectives downstream as a result of the multi-level intake structures.
- Two multi-level intake structures serve the six Hyatt units, each consisting of sloping structures with 13 control shutters and ranging in elevation from about

650 – 900 feet Intake No. 1 serves Units 1 – 3 and Intake No. 2 serves Units 4 – 6.

- The intake structures in Lake Oroville serve as diffusers of water pumped-back from Thermalito Diversion Pool.

Thermalito Diversion Pool - Flow Releases to Support the Fish Hatchery

- Flows through the fish hatchery range from about 30 – 130 cfs depending on hatchery operations, considering factors such as operations supporting seasonal migrations, fish population (number of rearing ponds in use), and life stages of the fish.
- The 1983 Agreement also specifies water temperature objectives that must be met within a deviation of plus or minus 4°F during April 1 – November 30.
- The water temperatures are facilitated by the use of a shutter controlled intake gate system in Lake Oroville which provides for withdrawing water of varying temperatures from different depths of the reservoir, blended with warmer water pumped-back from Thermalito Afterbay.
- Hyatt and Thermalito Pumping-Generating Plant operations for generation versus pumping modes can be influenced by these temperature objectives.

Thermalito Diversion Pool - Temperature Control

- Thermalito Diversion Pool serves as the primary location for monitoring the mixing of warmer and cooler water temperatures for meeting the downstream temperature requirements at the Fish Hatchery and Robinson's Riffle.
- During the course of generating and pump-back operations, warmer water can be introduced into the pool when pumping back through Thermalito Pump-Generating Plant, while cooler water can be introduced when generating through Hyatt Pumping-Generating Plant.
- Meeting temperature requirements can sometimes dictate the timing of pumping and generation operations at the Oroville Facilities.

Thermalito Diversion Dam Powerplant Operations

- The instream flow requirement is to maintain at all times a minimum of 600 cfs combined flow through Thermalito Diversion Dam Powerplant, diversion dam outlet and Feather River Fish Hatchery.
- The requirement is a result of the 1983 Agreement between DWR and CDFG, Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish & Wildlife (1983 Agreement).

2.2.4 Recreational Facilities

The majority of recreation facilities in the project area are within the Lake Oroville State Recreation Area (LOSRA), which has numerous facilities and sites that offer diverse recreational opportunities. LOSRA, managed by DPR, includes Lake Oroville and the surrounding lands and facilities within the project area, as well as the land and waters in and around the Diversion Pool and Thermalito Forebay, downstream of Oroville Dam. Lake Oroville is one of the largest lakes in California, with over 15,000 surface acres at full pool. The Diversion Pool and Thermalito Forebay are stable, with cool water reservoirs of 320 and 630 acres, respectively. Therefore, project operation to meet recreational use needs is an important consideration.

There are also recreational facilities and opportunities within the project area but outside LOSRA, specifically at the Thermalito Afterbay, Oroville Wildlife Area (OWA), and at the Feather River Fish Hatchery. Thermalito Afterbay is a 4,300-acre, shallow reservoir that receives water released from Lake Oroville and passes through Thermalito Forebay and Diversion Pool and associated power plants and canals. Descriptions of OWA and the Feather River Fish Hatchery and their operation are provided below.

The most popular activities in the project area include swimming, motorboating, bank fishing, water skiing and wakeboarding, boat fishing, use of personal watercraft, tent camping, houseboating, horseback riding, picnicking, recreational vehicle (RV) camping, and hiking.

2.3 PROPOSED OPERATIONS

No major upgrades are proposed for the Oroville Facilities, although it is anticipated that the pump units or turbines may be replaced at Thermalito Diversion Dam Powerplant or Thermalito Pumping-Generating Plant. On-going maintenance will include minor upgrades as necessary to maintain the facilities.

(Additional information may be added based on Resource Action review and evaluation.)

3.0 CAPACITIES, RATINGS, POWER PRODUCTION AND SUPPORTING DATA

3.1 MEAN, MINIMUM AND MAXIMUM FLOWS

Table B.3.1-1. Historical Flow for Lake Oroville

(cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	8,427	10,948	11,686	8,996	7,693	4,509	2,612	2,170	2,181	2,339	3,864	6,087
Max	276,552	200,537	110,245	83,860	88,773	22,862	9,290	5,521	6,723	11,137	69,998	171,347
Min	180	373	1,830	1,296	522	48	0	42	6	21	186	143

Source: DWR-O&M Project Records and Report section. Data from Jan 1st, 1979 to Jan 31, 2001.

See Appendix A: Annual and Monthly Flow versus Duration for Inflow of Lake Oroville.

3.2 AREA-CAPACITY CURVES FOR RESERVOIRS AND FOREBAYS

Following are Area-Capacity curves for the following impoundments:

- Lake Oroville
- Thermalito Diversion Pool
- Thermalito Forebay
- Thermalito Afterbay

3.2.1 Lake Oroville

The following data were used to prepare the Lake Oroville Area-Capacity Curves shown in Figure B.3.2-1.

Table B.3.2-1. Area-capacity for Lake Oroville.

Area (Acres)	**Elev.** (Feet)	**Capacity** Acres-Feet	**Area** (Acres)	**Elev.** (Feet)	**Capacity** Acres-Feet
3,074	520	328,458	8,279	720	1,413,689
3,258	530	360,109	8,620	730	1,498,174
3,454	540	393,661	8,967	740	1,586,087
3,659	550	429,216	9,328	750	1,677,554
3,875	560	466,879	9,689	760	1,772,690
4,100	570	506,733	10,074	770	1,871,515
4,323	580	548,836	10,472	780	1,974,241
4,554	590	593,213	10,874	790	2,080,970
4,795	600	639,950	11,281	800	2,191,742
5,044	610	689,134	11,691	810	2,306,596
5,302	620	740,852	12,113	820	2,425,574
5,565	630	795,177	12,543	830	2,548,850
5,839	640	852,196	12,969	840	2,676,447
6,117	650	911,974	13,413	850	2,808,348
6,400	660	974,559	13,868	860	2,944,745
6,689	670	1,040,005	14,334	870	3,085,746
6,993	680	1,108,409	14,813	880	3,231,454
7,309	690	1,179,914	15,305	890	3,382,038
7,634	700	1,254,632	15,801	900	3,537,577
7,951	710	1,332,547	16,344	910	3,698,295
			16,731	917	3,814,054

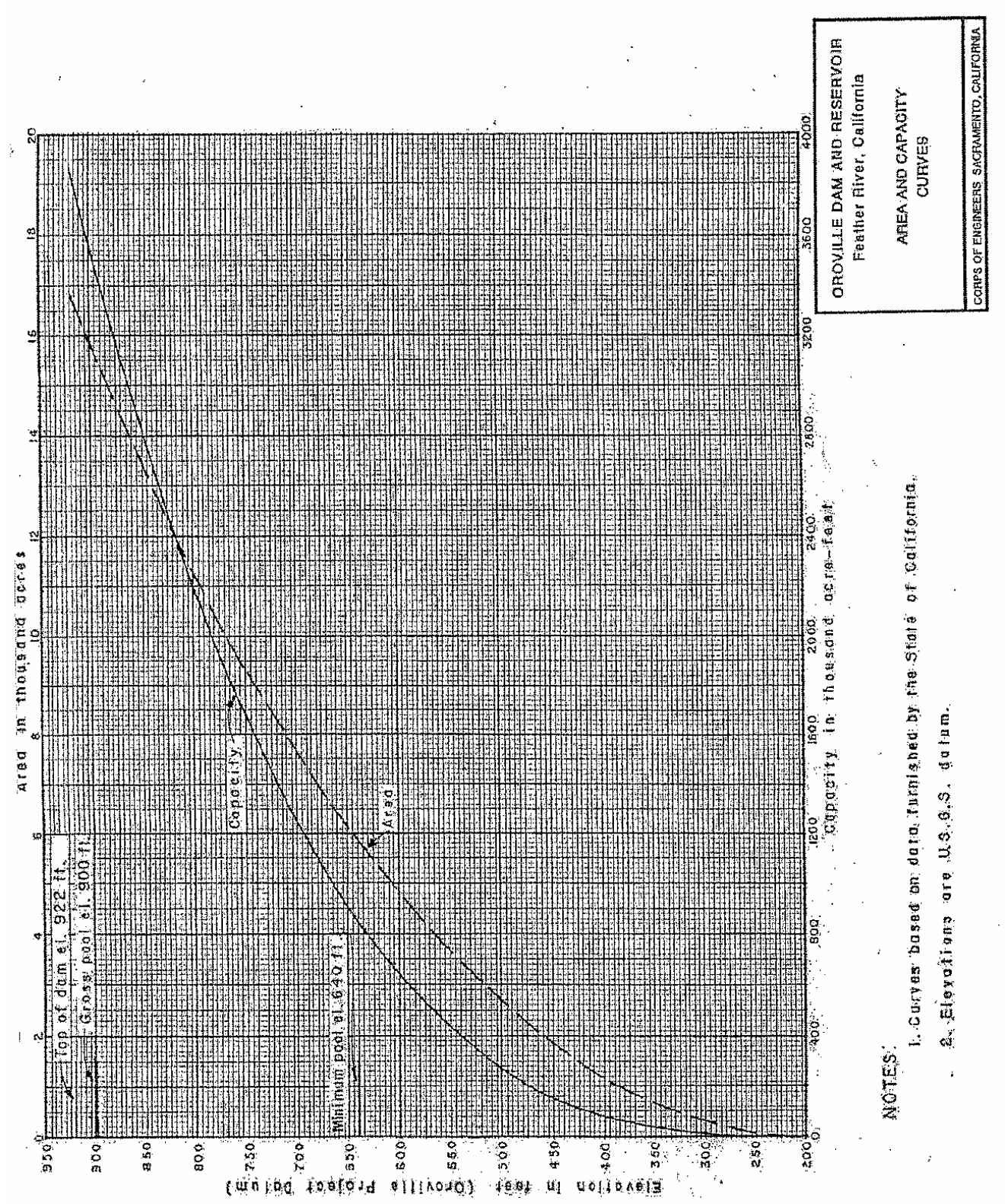


Figure B.3.2-1. Oroville Dam and Reservoir – Area-Capacity Curve.

3.2.2 Thermalito Diversion Pool

The following data were used to prepare the Thermalito Diversion Pool Area-Capacity Curves shown in Figure B.3.2-2.

Table B.3.2-2. Area-Capacity for Thermalito Diversion Pool.

Area (Acres)	**Elevation** (Feet)	**Capacity** Ac-Ft
0	136	0
8	140	16
16	145	76
26	150	176
41	155	344
59	160	594
78	165	935
99	170	1,377
118	175	1,930
145	180	2,589
171	185	3,380
195	190	4,296
215	195	5,326
232	200	6,444
249	205	7,647
266	210	8,936
285	215	10,313
304	220	11,785
323	225	13,353
343	230	15,018
347	231	15,363

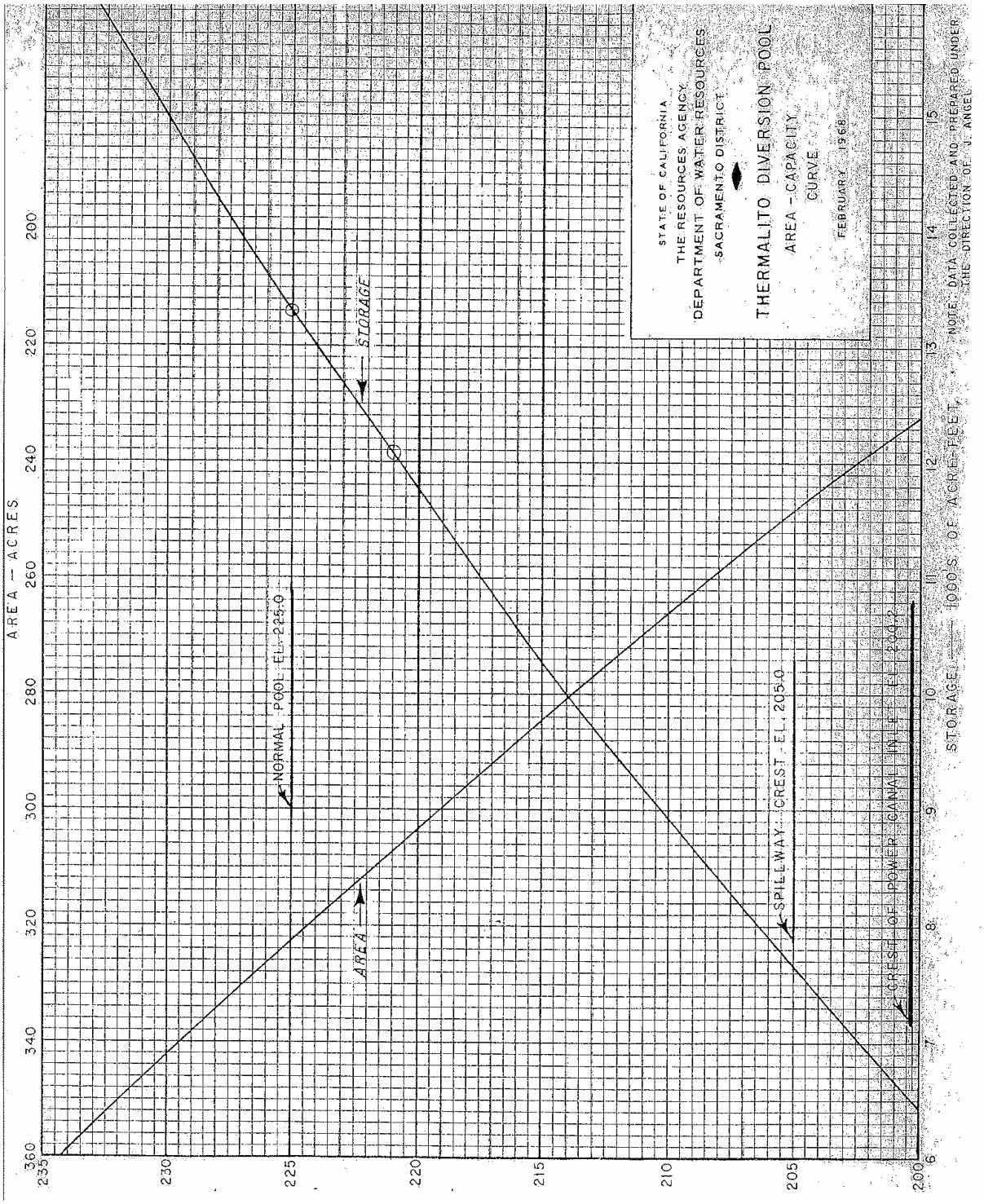


Figure B.3.2-2. Thermalito Diversion Pool – Area-Capacity Curve.

3.2.3 Thermalito Forebay

The following data were used to prepare the Thermalito Forebay Area-Capacity Curves shown in Figure B.3.2-3.

Table B.3.2-3. Area-Capacity for Thermalito Forebay.

Area (Acres)	**Elevation** (Feet)	**Capacity** Ac-Ft
1	178	0
1	180	2
5	185	15
29	190	95
85	195	363
202	200	1,115
286	205	2,341
375	210	3,993
483	215	6,126
568	220	8,776
630	225	11,768
698	230	15,083
713	231	15,789

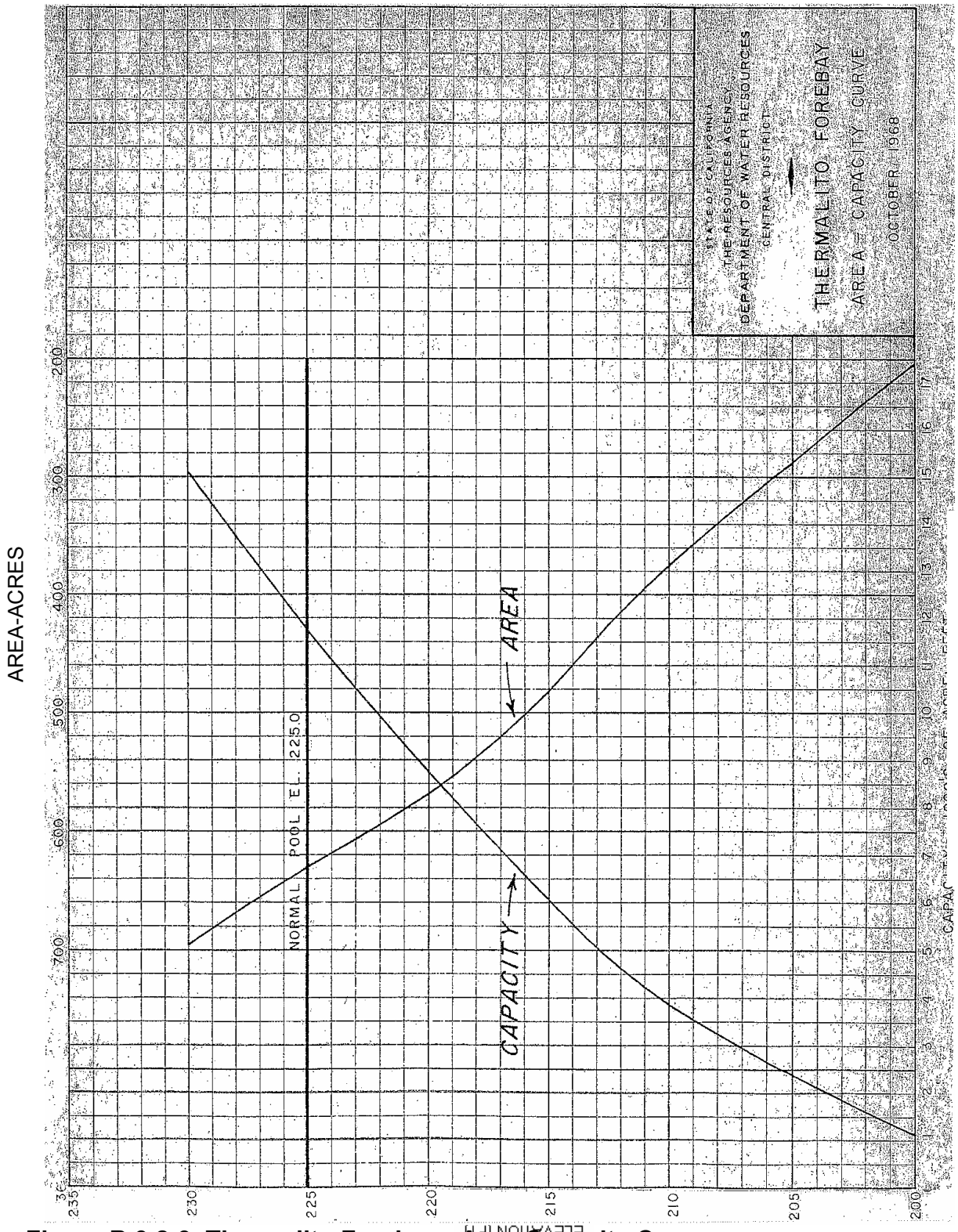


Figure B.3.2-3. Thermalito Forebay - Area-Capacity Curve.

3.2.4 Thermalito Afterbay

The following data were used to prepare the Thermalito Afterbay Area-Capacity Curves shown in Figure B.3.2-4.

Table B.3.2-4. Area-Capacity for Thermalito Afterbay.

Area (Acres)	**Elev.** (Feet)	**Capacity** Ac-Ft
6	95	0
14	100	49
20	105	137
73	110	306
564	115	1,573
1,714	120	7,056
2,508	125	17,581
3,324	130	32,151
4,094	135	50,739
4,901	142	82,490

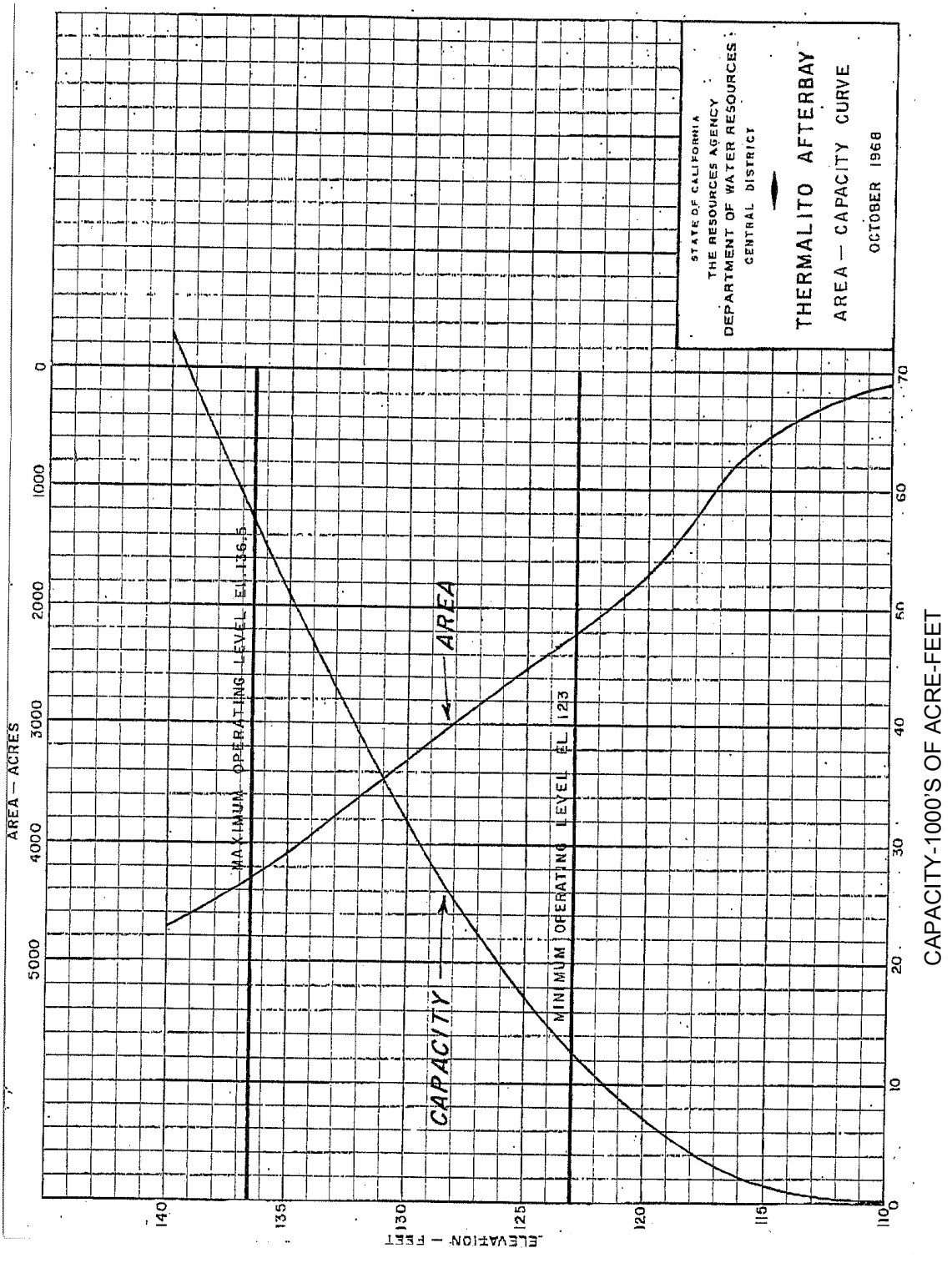


Figure B.3.2-4. Thermalito Afterbay - Area-Capacity Curve

3.3 HYDRAULIC CAPACITIES OF POWER PLANTS

3.3.1 Hyatt Pumping-Generating Plant

- Maximum generating release 16,950 cfs
- Maximum pumping capacity 5,610 cfs

3.3.2 Thermalito Diversion Dam Powerplant

- Maximum generating release 615 cfs

3.3.3 Thermalito Pumping-Generating Plant

- Maximum generating release 17,400 cfs
- Maximum pumping capacity 9,120 cfs

3.4 TAILWATER RATING CURVES FOR POWER PLANTS

In general, the tailwater at the three plants of the Oroville Facilities is not related to the discharge flow through the plant. It depends on the downstream structure and remains relatively constant.

3.4.1 Hyatt Pumping-Generating Plant

The tailwater conditions at Hyatt Pumping-Generating Plant are defined by the Thermalito Diversion Pool. The Diversion Pool extends up to the Hyatt outlet portals, located at the Hyatt Pumping-Generating Plant. The Diversion Pool elevation ranges from elevation 221.0 minimum to elevation 225.0 maximum and is independent of the flow through Hyatt Pumping-Generating Plant.

3.4.2 Thermalito Diversion Dam Powerplant

The nominal tailwater conditions at Thermalito Diversion Dam Powerplant are essentially defined by the fixed elevation of the Fish Barrier Dam.

3.4.3 Thermalito Pumping-Generating Plant

The tailwater conditions at Thermalito Pumping-Generating Plant are defined by the elevation of Thermalito Afterbay, which operates in the range between elevation 123.0 feet and elevation 136.5 feet. This Afterbay elevation is unaffected by the flow through Thermalito Pumping-Generating Plant.

3.5 POWER PLANT CAPACITY VS. HEAD CURVES

3.5.1 Hyatt Pumping-Generating Plant (license capacity 645 MW)

Curves of power plant capability versus head and specifying maximum, normal, and minimum heads.

Table B.3.5-1.

	Generating
Maximum Capacity	679 MW
Maximum Static Head	676 ft
Minimum	410 ft

3.5.2 Thermalito Diversion Dam Powerplant (license capacity 3 MW)

Table B.3.5-2.

	Generating
Maximum Capacity	3 MW
Maximum Static Head	77 ft
Minimum	63 ft

3.5.3 Thermalito Pumping-Generating Plant (license capacity 114 MW)

Table B.3.5-3.

	Generating
Maximum Capacity	120 MW
Maximum Static Head	102 ft
Minimum	85 ft

4.0 UTILIZATION OF PROJECT POWER

4.1 HYDROPOWER OPERATION

Releases from Lake Oroville are routed through the Hyatt Pumping-Generating Plant into the Feather River for power generation. Releases that exceed Feather River instream requirements flow into the Thermalito Forebay. The portion of the water released to meet instream requirements is discharged through Thermalito Diversion Dam Powerplant or through the spillway. The water in the Thermalito Forebay is routed through the Thermalito Pumping-Generating Plant into Thermalito Afterbay. Inflow to Thermalito Afterbay from peak power generation, in excess of local and downstream requirements, is stored for later release to the river. If energy price and availability factors are favorable, the water stored in Thermalito Afterbay may be pumped back through Thermalito Pumping-Generation Plant and Hyatt Pumping-Generating Plant into Lake Oroville during off-peak hours. Operation in a pumped storage mode most commonly occurs when energy values are high during weekday on-peak hours (when water is released at Oroville for peak power generation) and low during the weekday off-peak hours or on the weekend (when water is pumped back into Lake Oroville for subsequent power generation).

Operations of the Oroville Facilities are planned and scheduled in concert with other SWP facilities. Its water meets local and downstream demands when unregulated flows alone are not enough to satisfy those needs. Operation of the Oroville Facilities varies seasonally, weekly, and hourly depending on hydrology and current operational objectives. Typically, releases to the Feather River are managed to conserve water while meeting instream, Sacramento-San Joaquin Delta, and SWP requirements including flow, temperature, fisheries, recreation, water quality, and agricultural diversions.

Local water supply diversions take water directly from Thermalito Afterbay. The total capacity of Thermalito Afterbay diversions during periods of peak water supply demands is 4,050 cfs. The Oroville Facilities have a capacity of approximately 17,000 cfs through the power plants, which can be returned to the Feather River via the Thermalito Afterbay Outlet.

4.2 POWER TRANSACTIONS

Overall, the SWP uses more energy than it produces. To balance SWP loads with available resources, DWR relies upon a suite of options that include purchases from the day-ahead, and hour-ahead markets; capacity exchanges; and energy contracts (both short and long-term). Two such contracts with Southern California Edison Company (SCE) allow DWR to exchange on-peak capacity and energy for off-peak energy that may be used elsewhere within the SWP system. Specifically, under the terms of the 1979 Power Contract and the 1981 Capacity Exchange Agreement, DWR provides SCE

with up to 350 MW of capacity and approximately 40 percent of the energy from the Oroville Facilities. In return, DWR receives off-peak energy from SCE equal to the amount of energy provided to SCE from the Oroville Facilities, plus an additional amount of energy as payment for the on-peak capacity. The amount of additional energy is determined annually based on the Capacity-Energy Exchange Formula defined in the 1979 Power Contract.

4.3 LOAD MANAGEMENT

The SWP controls the timing of its pumping load through an extensive computerized network. This control system allows DWR to minimize the cost of power it purchases by maximizing pumping during off-peak periods when power costs are lower—usually at night—and by selling power to other utilities during on-peak periods when power values are high. By taking advantage of this flexibility in scheduling SWP pumping load and generation, DWR reduces the net cost for SWP water deliveries.

When generation from the Oroville Facilities exceeds SWP load requirements, DWR sells the excess power on the market. Currently, DWR contracts with utilities and marketers for short-term purchase, sale, or exchange of power. In addition to selling firm power, DWR may sell power on a day-to-day or hour-to-hour basis according to the terms of its interchange agreements and the Western System Power Pool agreement. These agreements provide the basis for making energy transactions, short-term capacity and energy sales or exchanges, unit commitments, and transmission service purchases.

4.4 HISTORICAL ANNUAL GENERATION

Hydroelectric generation provides the largest share of SWP power resources. However, hydroelectric generation at the Oroville Facilities is greatly affected by the amount of annual runoff to the Feather River watershed. The combined 762 MW Hyatt and Thermalito Pumping-Generating Plants generate about 2.2 billion kWh in a median water year (DWR 1999). The 3 MW output from the Thermalito Diversion Dam Powerplant adds another 24 million kWh a year. Over the past 20 years, the range of generation has varied from below 1 million MWh in 1991 and 1992 (critically dry years) to over 4 million MWh in 1982-1983 (very wet years).

Monthly generation made available to the SWP in recent years (Calendar year 1982 through 2001) from the Oroville Facilities operation is summarized in Table B.4.4-1 below. This generation data represents the combined generation output from Hyatt Pumping-Generating Plant, Thermalito Pumping-Generating Plant, and Thermalito Diversion Dam Powerplant. The average for this 20-year period was 2.4 billion kWh per year.

Table B.4.4-1. Energy Generation at Oroville Facilities /a/, /b/ (in MWh)

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
1982	429,640	395,540	454,680	571,280	436,870	280,310	267,590	327,870	255,520	155,500	162,840	343,190	4,080,830
1983	344,020	465,550	567,570	569,240	545,240	465,220	367,900	310,930	263,430	149,210	296,980	557,690	4,902,980
1984	432,360	216,240	246,130	153,470	212,480	244,120	359,760	248,730	170,750	97,870	86,320	173,210	2,641,440
1985	81,480	98,750	93,450	123,000	285,390	285,710	264,980	190,870	71,530	104,620	75,680	40,330	1,715,790
1986	44,320	303,700	536,720	148,440	169,870	167,340	313,110	223,160	201,880	154,050	99,610	88,310	2,450,510
1987	82,620	51,730	57,870	120,870	165,600	192,200	239,710	164,320	101,190	74,520	69,730	69,340	1,389,700
1988	55,790	60,740	135,000	162,760	132,290	189,830	241,440	160,820	129,880	102,970	101,290	78,990	1,551,800
1989	64,460	96,390	71,340	62,780	185,710	209,650	358,240	284,110	146,060	108,410	109,780	217,250	1,914,180
1990	117,730	84,180	107,930	260,020	176,890	134,450	189,070	174,740	54,550	46,760	44,910	123,940	1,515,170
1991	48,890	23,140	22,070	21,300	123,030	159,430	135,410	73,920	53,710	49,390	33,450	67,410	811,150
1992	32,070	19,510	55,580	21,100	143,540	119,620	138,680	112,210	90,790	51,850	35,660	47,000	867,610
1993	24,470	48,070	357,360	287,330	286,590	296,330	380,550	363,150	107,230	103,550	124,790	241,450	2,620,870
1994	77,790	51,690	76,010	125,150	168,380	185,180	215,560	172,930	137,850	120,330	80,100	89,490	1,500,460
1995	195,790	396,770	452,970	464,890	498,360	490,320	271,230	304,380	292,480	149,930	125,740	233,660	3,876,520
1996	233,350	506,610	347,130	361,980	384,560	275,610	382,600	301,530	113,110	122,280	131,500	432,230	3,592,490
1997	456,210	390,660	138,180	114,530	200,590	258,450	402,520	254,240	129,520	162,090	117,750	103,710	2,728,450
1998	250,090	470,160	420,670	324,010	383,020	423,400	343,630	325,400	263,780	155,810	97,970	411,110	3,869,050
1999	268,034	457,775	307,517	157,986	210,662	191,981	465,021	280,865	164,538	152,924	127,640	162,475	2,947,418
2000 /c/	108,927	259,837	369,124	175,572	245,297	281,055	384,404	308,198	175,189	165,647	150,533	133,188	2,756,971
2001 /c/	97,975	57,222	79,772	78,292	192,980	162,097	149,266	139,137	63,952	92,001	63,770	69,149	1,245,613

Source:
/a/ Generation amounts obtained from Table 10-2, Energy Generated and Purchased, by Month*, Bulletin 132.*
/b/ Oroville Facilities include Hyatt, Thermalito, and Thermalito Diversion Dam Power Plants.
/c/ Energy generation amounts for calendar years 2000 and 2001 are preliminary and subject to adjustment.

5.0 PLANS FOR FUTURE DEVELOPMENT

No major upgrades are proposed for the Oroville Facilities, although it is anticipated that the pump units or turbines may be replaced at Thermalito Diversion Dam Power Plant or Thermalito Pumping-Generating Plant. On going maintenance will include minor upgrades as necessary to maintain the facilities.

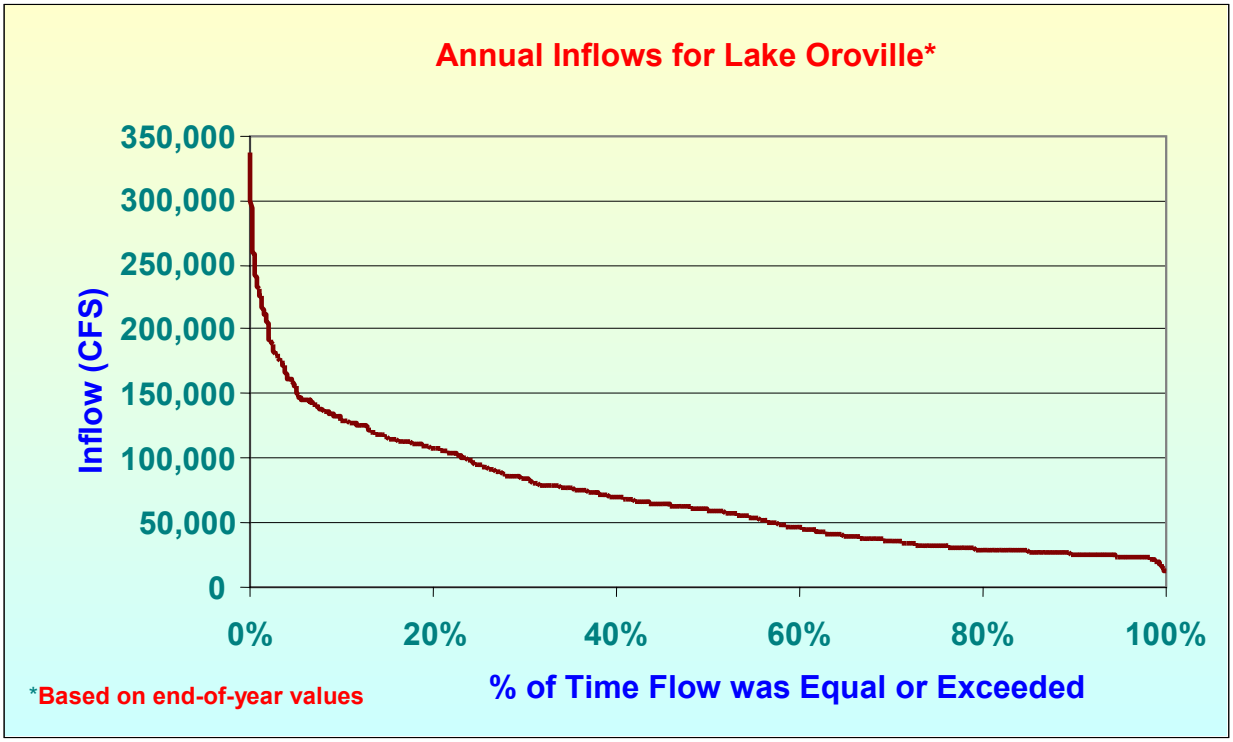
(Additional information may be added based on Resource Action review and evaluation.)

6.0 REFERENCES

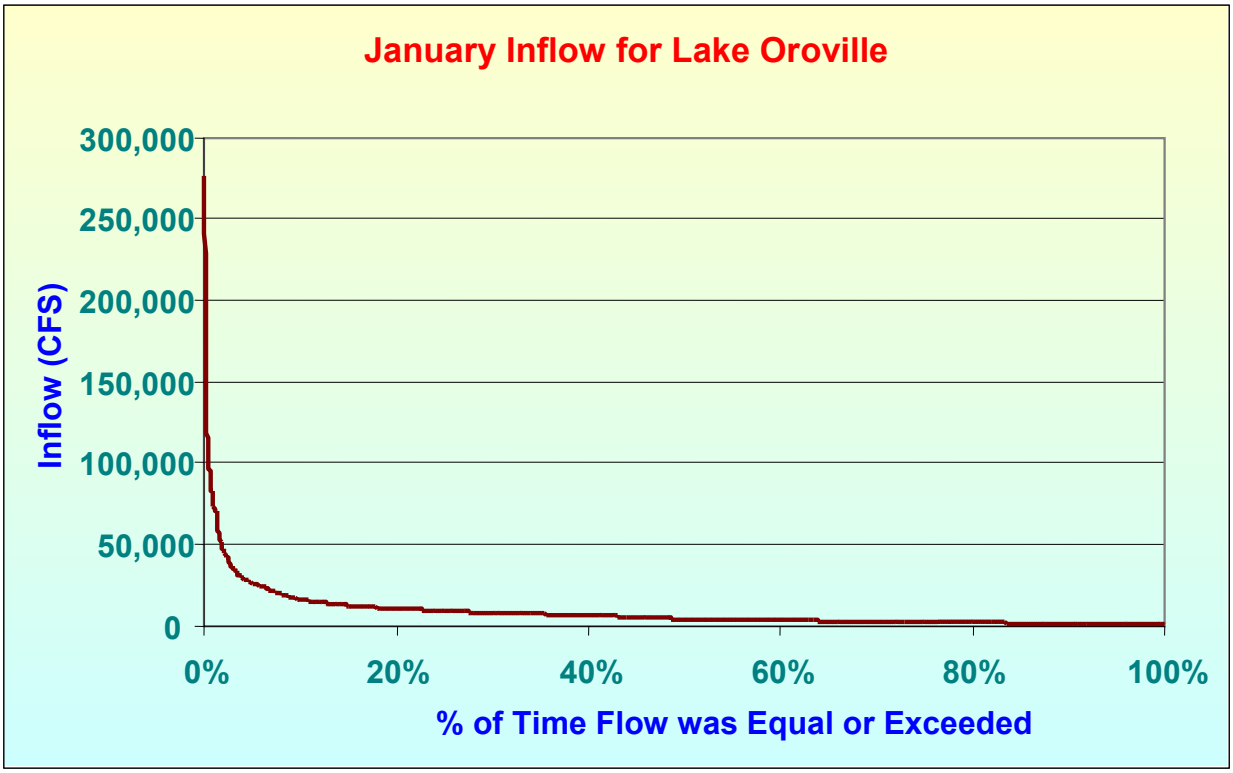
DWR (California Department of Water Resources). Management of the State Water Project. DWR Bulletin Number 200. Sacramento, CA November 1974.

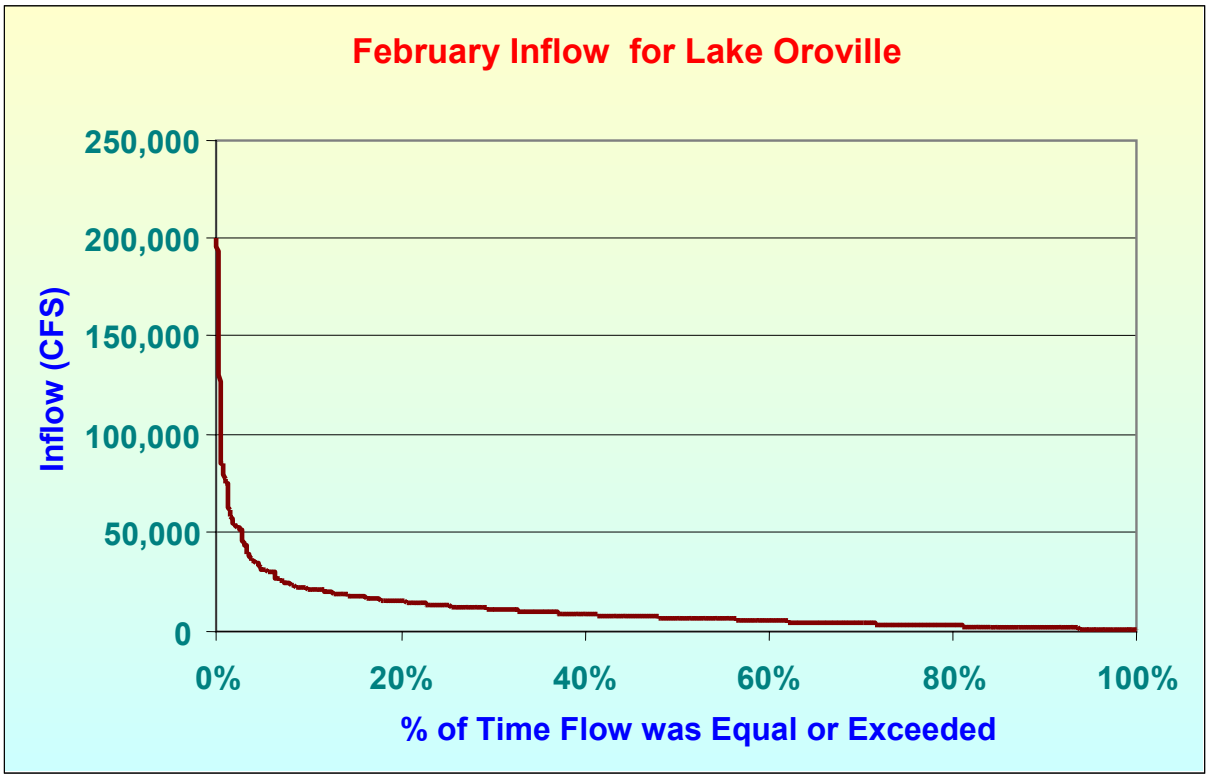
DWR-NEPA Scoping Document 2 and Amended CEQA Notice of Preparation. Oroville Facilities Relicensing-FERC Project 2100-Febuary 25, 2003.

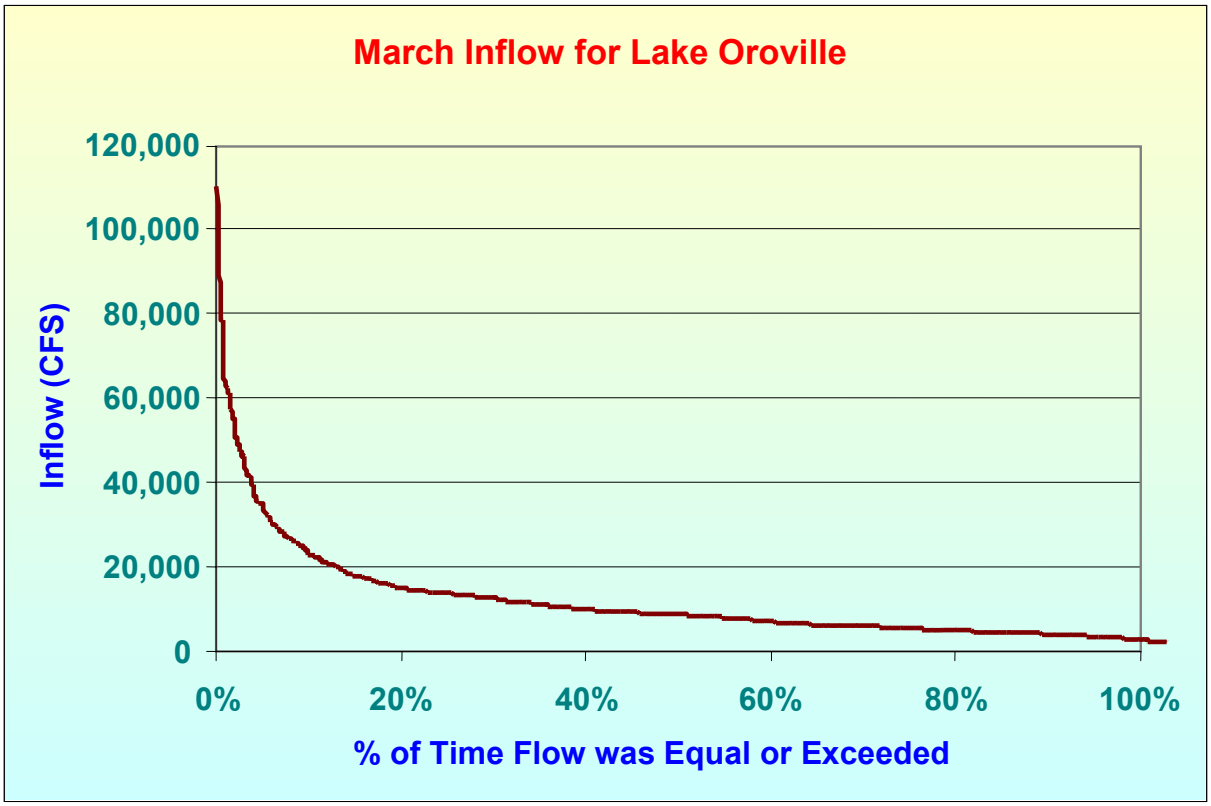
APPENDIX A.
ANNUAL AND MONTHLY FLOW VERSUS DURATION FOR INFLOW OF LAKE OROVILLE

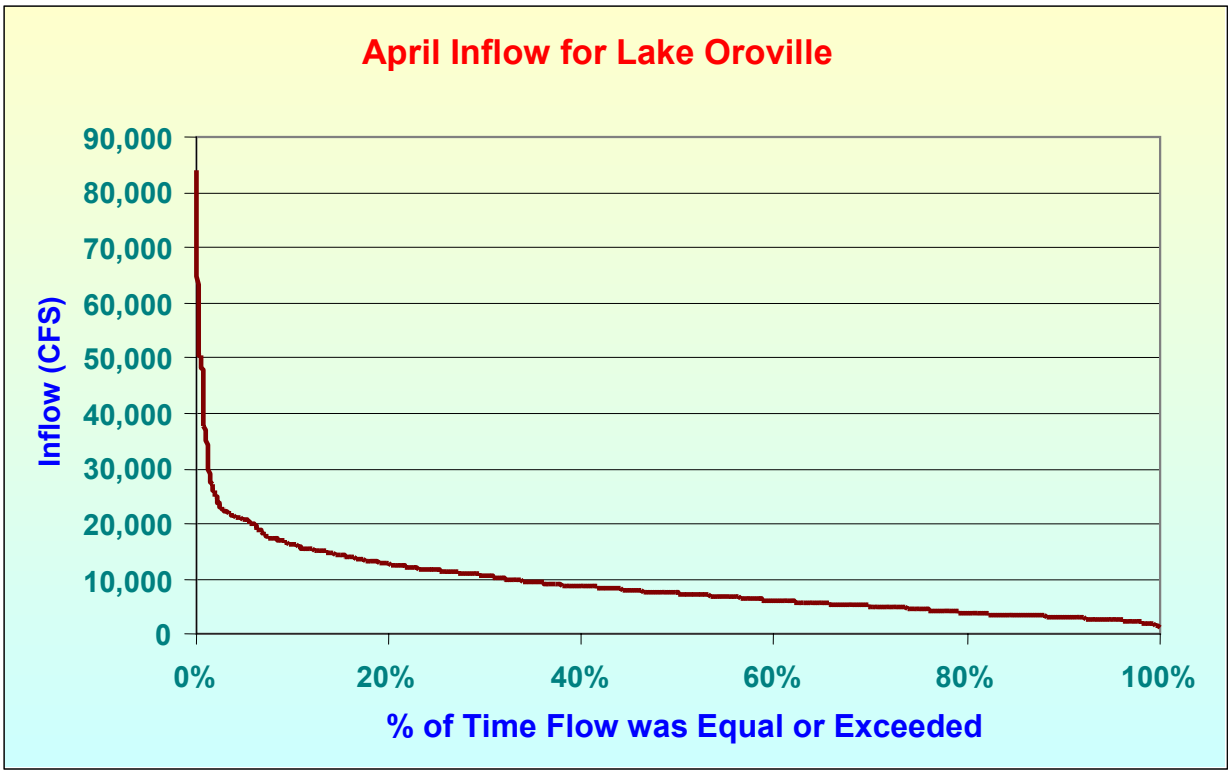


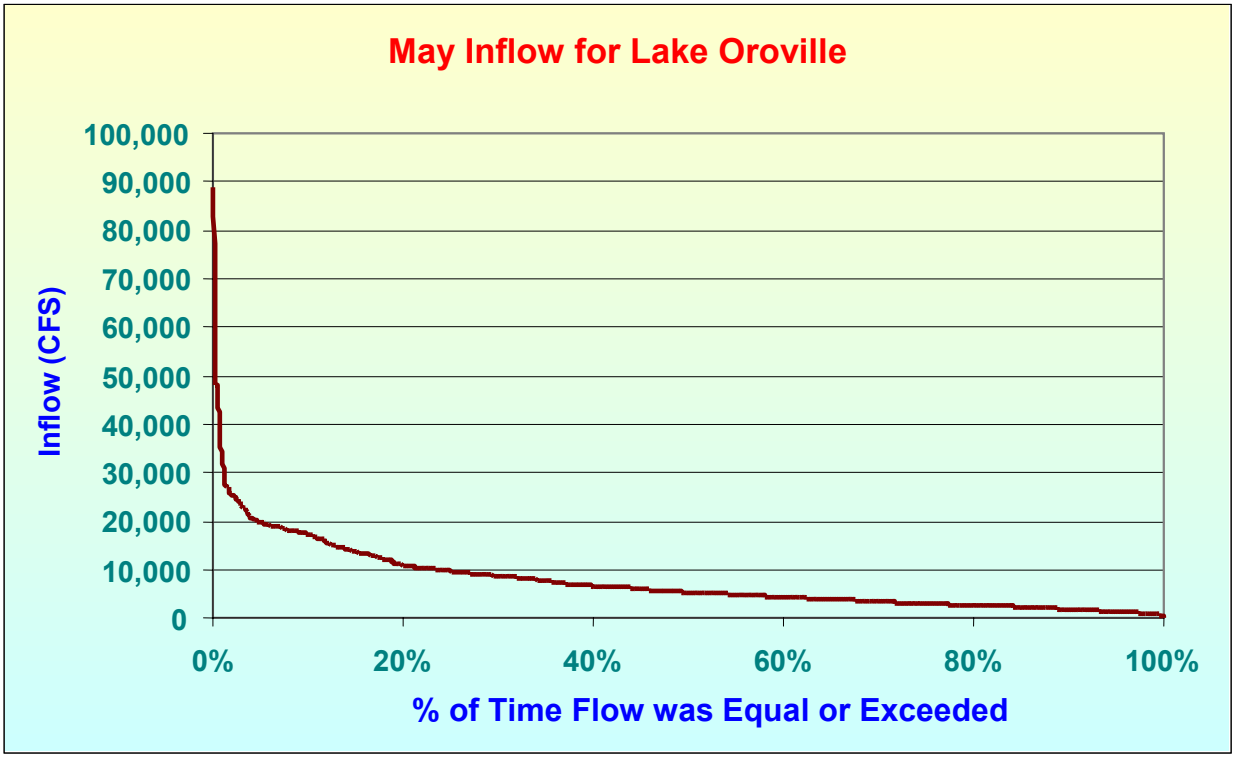
Source: DWR 2004. Inflows based on daily data from 1979 to 2001

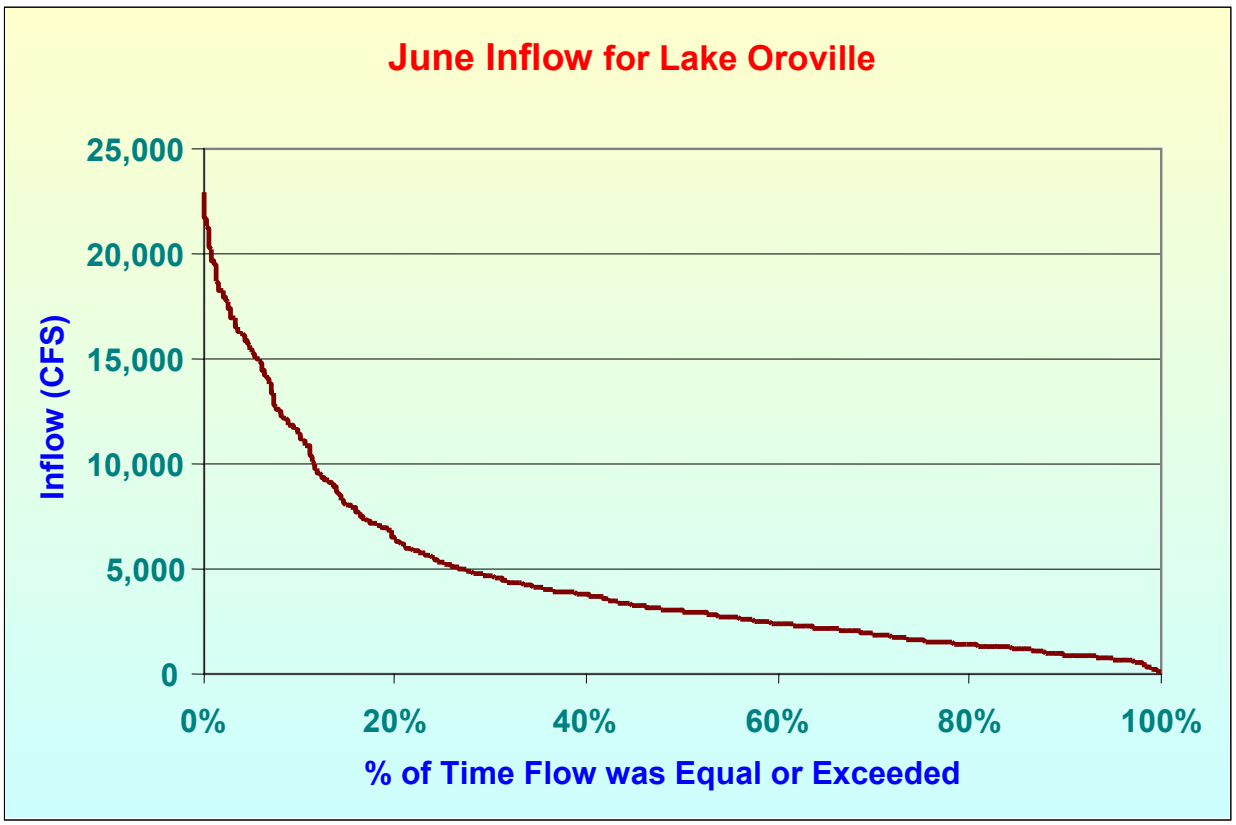

January Inflow for Lake Oroville
300,000
250,000
200,000
150,000
100,000
50,000
0
Inflow (CFS)
0%
20%
40%
60%
80%
100%
% of Time Flow was Equal or Exceeded

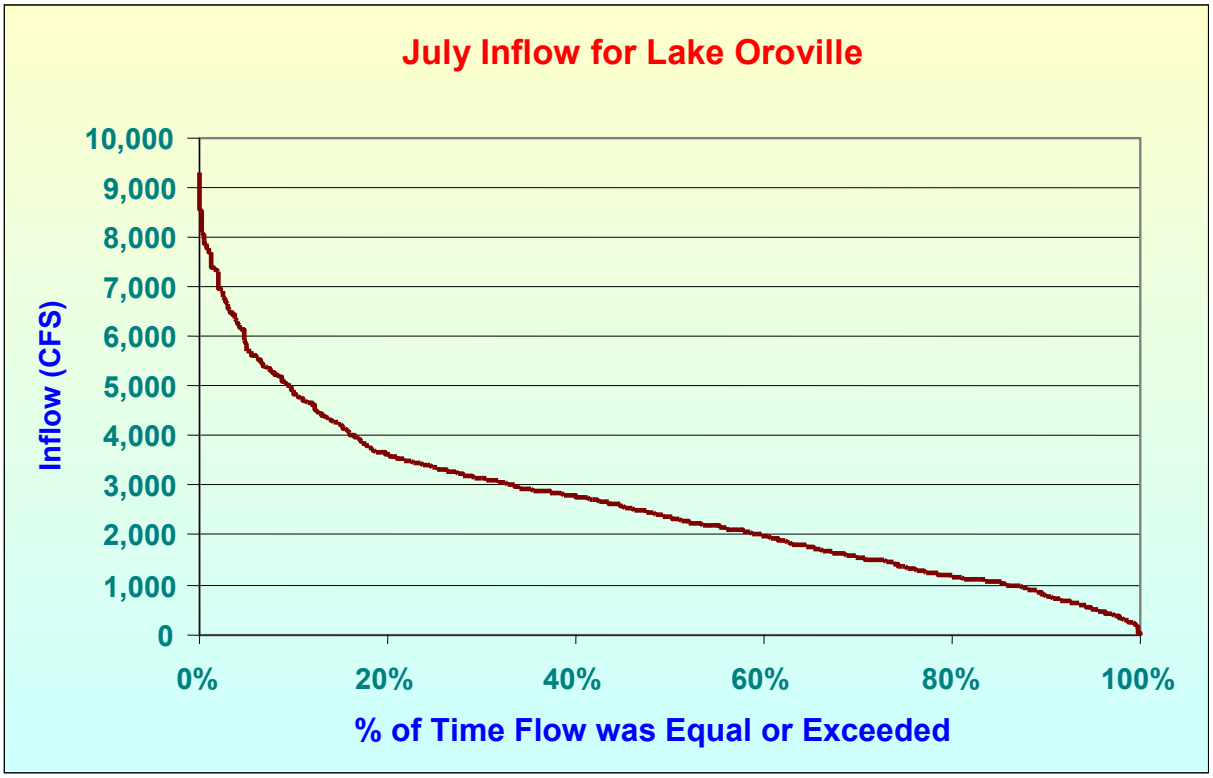

February Inflow for Lake Oroville
250,000
200,000
150,000
100,000
50,000
0
Inflow (CFS)
0%
20%
40%
60%
80%
100%
% of Time Flow was Equal or Exceeded

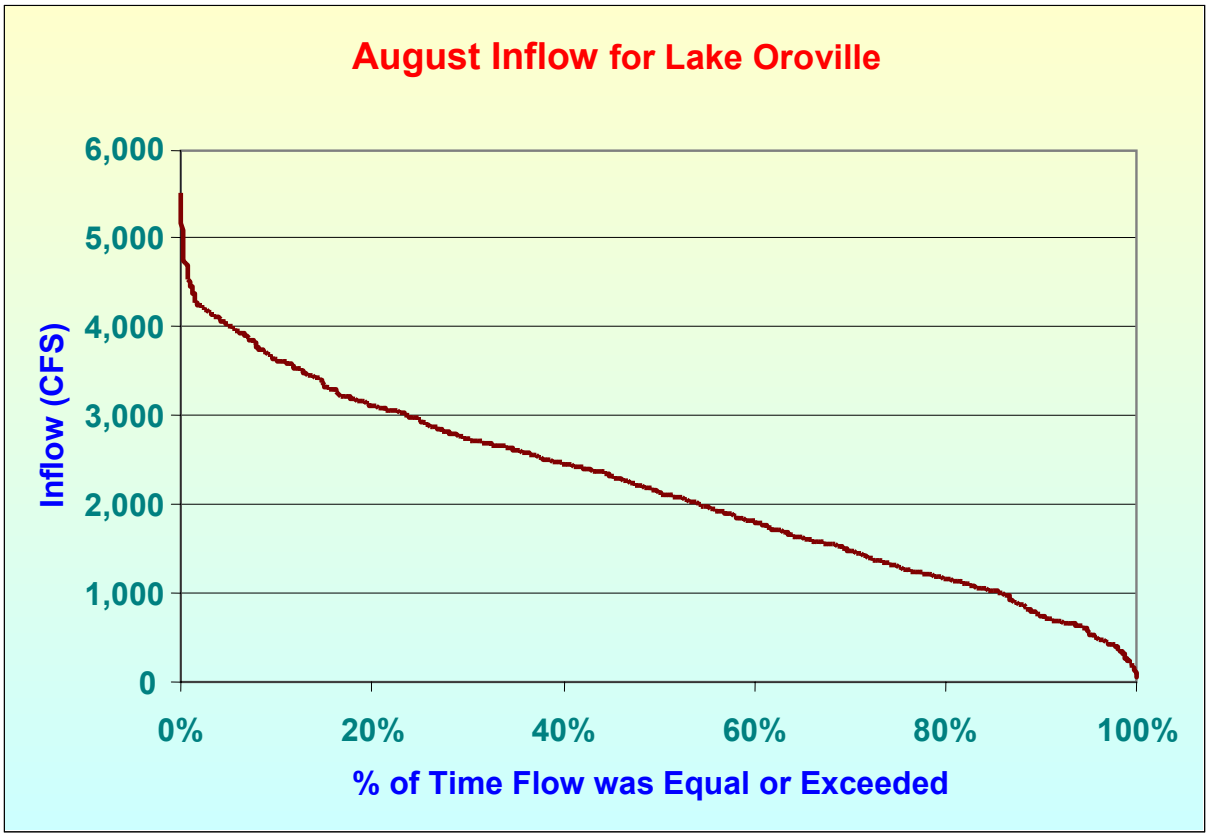

March Inflow for Lake Oroville
120,000
100,000
80,000
60,000
40,000
20,000
0
Inflow (CFS)
0%
20%
40%
60%
80%
100%
% of Time Flow was Equal or Exceeded

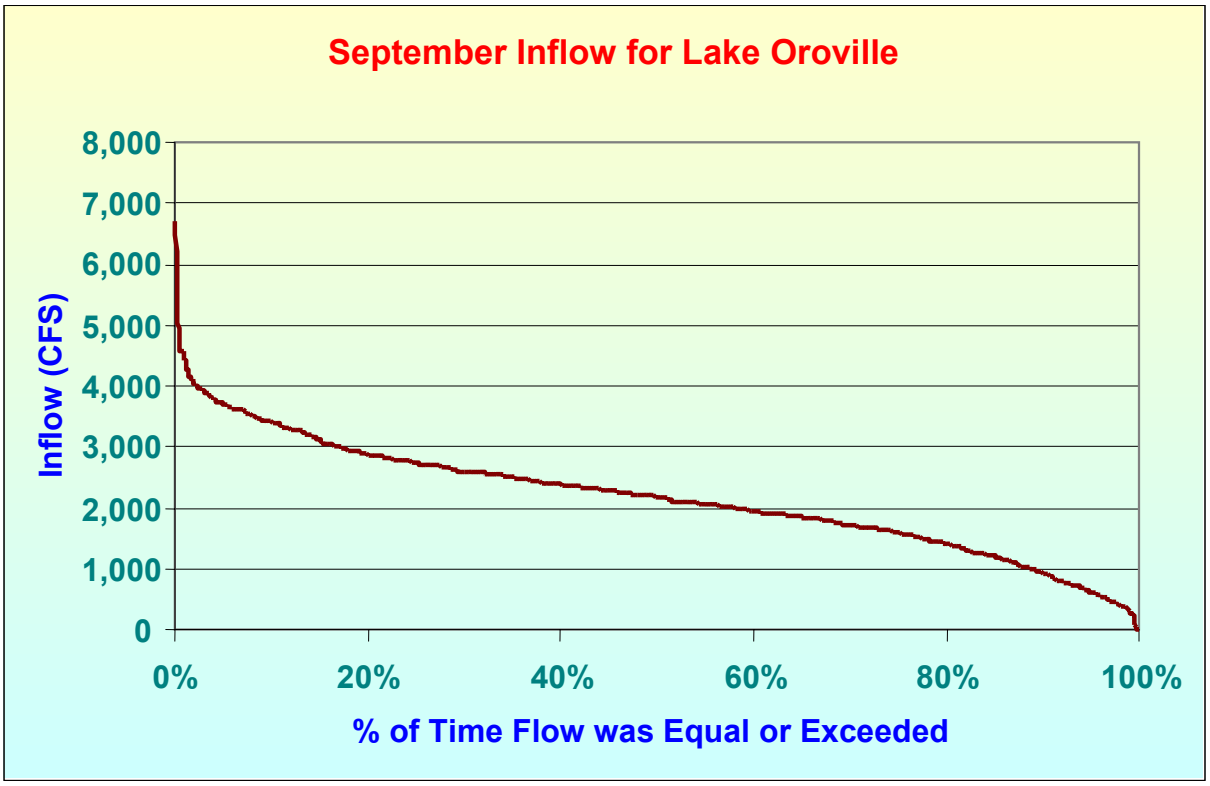

April Inflow for Lake Oroville
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Inflow (CFS)
0%
20%
40%
60%
80%
100%
% of Time Flow was Equal or Exceeded

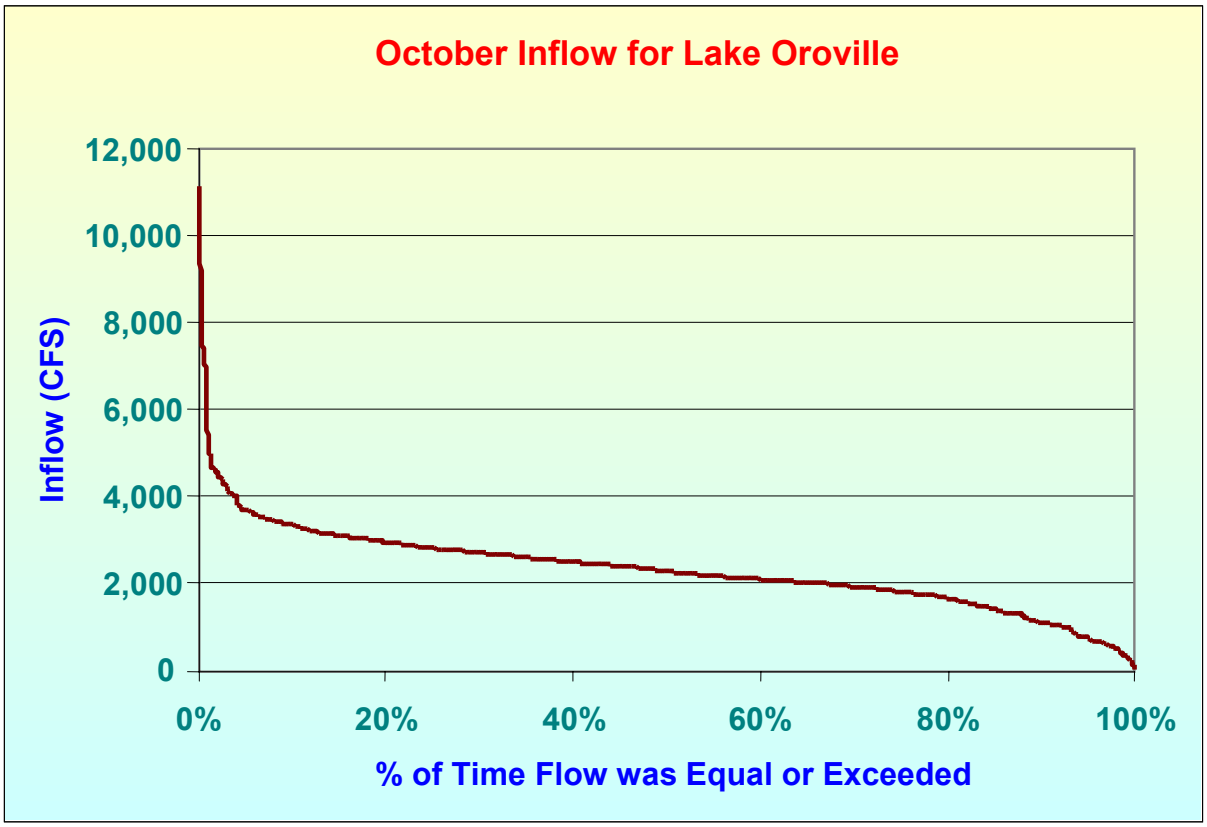

May Inflow for Lake Oroville
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Inflow (CFS)
0%
20%
40%
60%
80%
100%
% of Time Flow was Equal or Exceeded

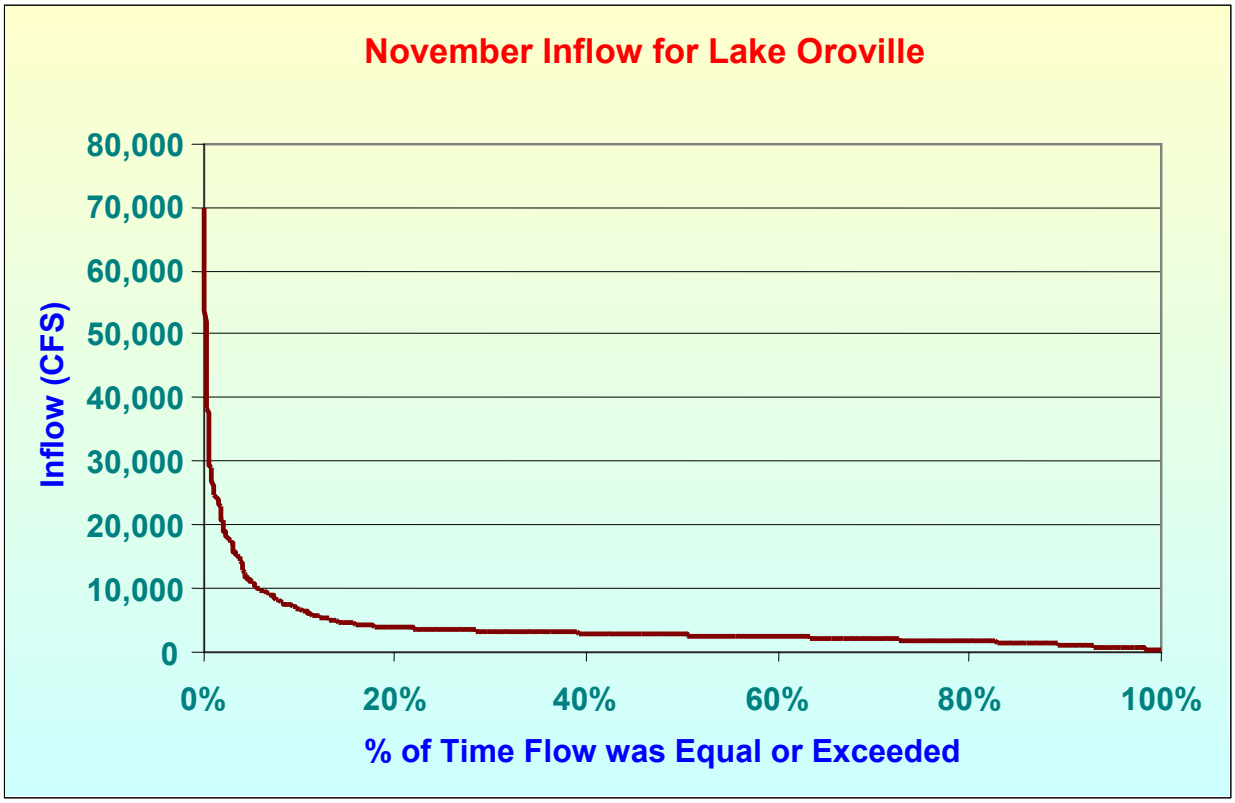

June Inflow for Lake Oroville
25,000
20,000
15,000
10,000
5,000
0
Inflow (CFS)
0%
20%
40%
60%
80%
100%
% of Time Flow was Equal or Exceeded

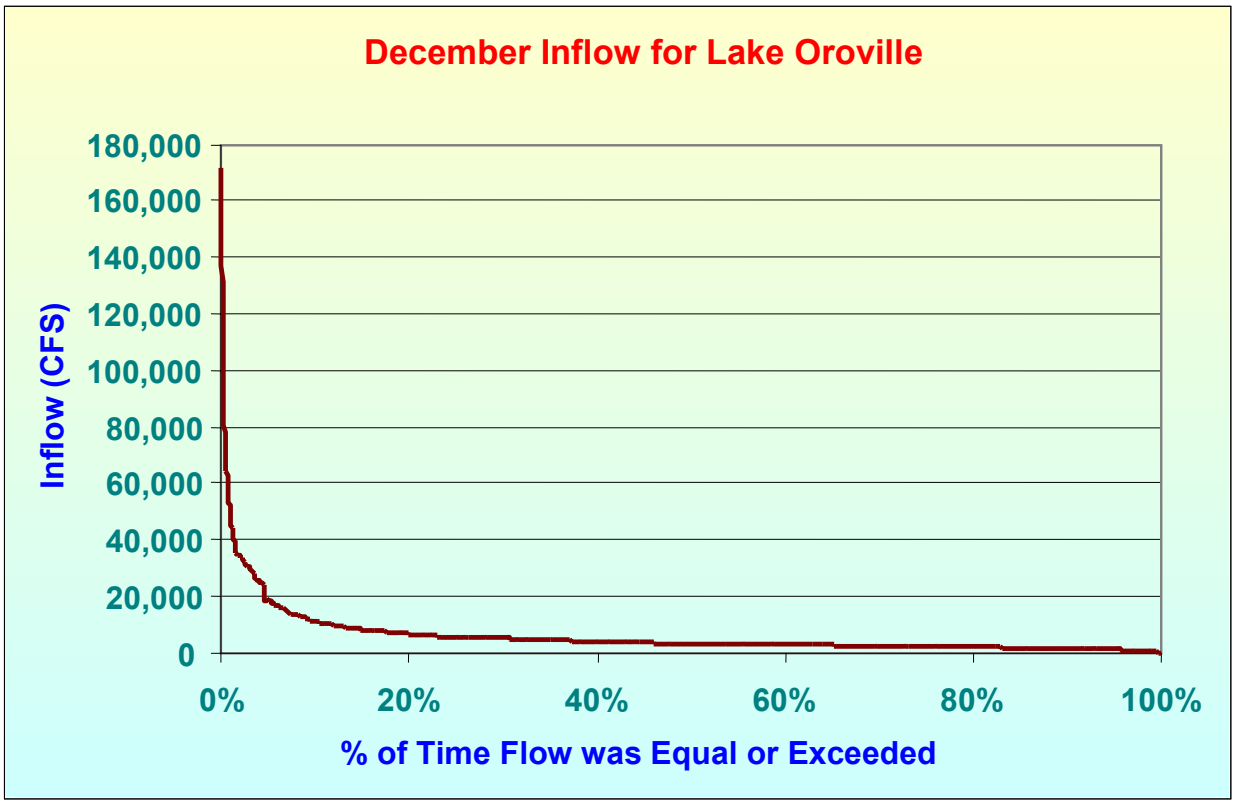

July Inflow for Lake Oroville
Inflow (CFS)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0%
20%
40%
60%
80%
100%
% of Time Flow was Equal or Exceeded


August Inflow for Lake Oroville
Inflow (CFS)
6,000
5,000
4,000
3,000
2,000
1,000
0
0%
20%
40%
60%
80%
100%
% of Time Flow was Equal or Exceeded


September Inflow for Lake Oroville
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Inflow (CFS)
0%
20%
40%
60%
80%
100%
% of Time Flow was Equal or Exceeded


October Inflow for Lake Oroville
12,000
10,000
8,000
6,000
4,000
2,000
0
Inflow (CFS)
0%
20%
40%
60%
80%
100%
% of Time Flow was Equal or Exceeded


November Inflow for Lake Oroville
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Inflow (CFS)
0%
20%
40%
60%
80%
100%
% of Time Flow was Equal or Exceeded


December Inflow for Lake Oroville
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Inflow (CFS)
0%
20%
40%
60%
80%
100%
% of Time Flow was Equal or Exceeded

State of California
The Resources Agency
Department of Water Resources

DRAFT
EXHIBIT C – CONSTRUCTION HISTORY AND PROPOSED CONSTRUCTION SCHEDULE

Oroville Division, State Water Facilities
FERC Project No. 2100

APRIL 30, 2004

ARNOLD SCHWARZENEGGER
Governor
State of California

MIKE CHRISMAN
Secretary for Resources
The Resources Agency

LESTER A. SNOW
Director
Department of Water Resources

State of California
The Resources Agency
Department of Water Resources

DRAFT
EXHIBIT C – CONSTRUCTION HISTORY AND PROPOSED CONSTRUCTION SCHEDULE

Oroville Division, State Water Facilities
FERC Project No. 2100

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 GENERAL PROJECT DESCRIPTION

1.1 OVERVIEW

The Oroville Facilities (FERC Project No. 2100) were developed as part of the State Water Project (SWP), a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose of the SWP is to store and distribute water to supplement the needs of urban and agricultural water users in northern California, the San Francisco Bay area, the San Joaquin Valley, and southern California. The Oroville Facilities are also operated for flood management, power generation, water quality improvement in the Delta, and recreation and fish and wildlife enhancement.

FERC Project No. 2100 encompasses 41,100 acres and includes Oroville Dam and Reservoir, three power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Power Plant, and Thermalito Pumping-Generating Plant), Thermalito Diversion Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal, Oroville Wildlife Area (OWA), Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, and transmission lines, as well as a number of recreational facilities. An overview of these facilities is provided on Figure C.1.2-1. The Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5-million-acre-feet (maf) capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level.

1.2 EXISTING POWER FACILITIES

The hydroelectric facilities have a combined license generating capacity of approximately 762 megawatts (MW). The Hyatt Pumping-Generating Plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels into the Feather River just downstream of Oroville Dam. The plant has a generating and pumping flow capacity of 16,950 cfs and 5,610 cfs, respectively. Other generation facilities include the 3 MW Thermalito Diversion Dam Power Plant and the 114 MW Thermalito Pumping-Generating Plant.

Thermalito Diversion Dam, four miles downstream of the Oroville Dam creates a tail water pool for the Hyatt Pumping-Generating Plant and is used to divert water to the Thermalito Power Canal. The Thermalito Diversion Dam Power Plant is a 3 MW power plant located on the left abutment of the Diversion Dam. The power plant releases a maximum of 615 cubic feet per second (cfs) of water into the river.

The Thermalito Power Canal is a 10,000-foot-long channel designed to convey generating flows of 16,900 cfs to the Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. The Thermalito Forebay is an off-stream regulating reservoir for the 114 MW Thermalito Pumping-Generating Plant. The Thermalito

Pumping-Generating Plant is designed to operate in tandem with the Hyatt Pumping-Generating Plant and has generating and pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into the Thermalito Afterbay, which is contained by a 42,000-foot-long earth-fill dam. Thermalito Afterbay is used to release water into the Feather River downstream of the Oroville Facilities, helps regulate the power system, provides storage for pump-back operations, and provides recreational opportunities. Several local irrigation districts receive water from Thermalito Afterbay.

1.3 EXISTING ENVIRONMENTAL AND RECREATION COMMITMENTS

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the dam and the Thermalito Afterbay Outlet and provides attraction flow for the hatchery. The Feather River Fish Hatchery, an anadromous fish hatchery, was built to compensate for the loss of spawning grounds and rearing areas for returning salmon and steelhead trout and their offspring; the spawning grounds and rearing areas were lost due to construction of Oroville Dam. The hatchery has recently accommodated more than 20,000 adult fish and 15 million young fish annually.

The Oroville Facilities support a wide variety of recreational opportunities. These opportunities include: boating (several types), fishing (several types), fully developed and primitive camping (including boat-in and floating sites), picnicking, swimming, horseback riding, hiking, off-road bicycle riding, wildlife watching, and hunting. There are also visitor information sites with cultural and informational displays about the developed facilities and the natural environment. There are major recreation facilities at Loafer Creek, Bidwell Canyon, Spillway, North and South Thermalito Forebay, and Lime Saddle. Lake Oroville has two full-service marinas, five car-top boat launch ramps, ten floating campsites, and seven dispersed floating toilets. There are also recreation facilities at the Visitors Center and the OWA.

The OWA comprises approximately 11,000-acres west of Oroville that is managed for wildlife habitat and recreational activities. It includes the Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The 5,000-acre area straddles 12 miles of the Feather River, which includes willow and cottonwood-bordered ponds, islands, and channels. Recreation areas include dispersed recreation (hunting, fishing, and bird watching), plus recreation at developed sites, including Monument Hill Day Use Area, model airplane grounds, three boat launches on Thermalito Afterbay and two on the river, and two primitive camping areas. California Department of Fish and Game's (DFG) habitat enhancement program includes a wood duck nest-box program and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a number of locations.

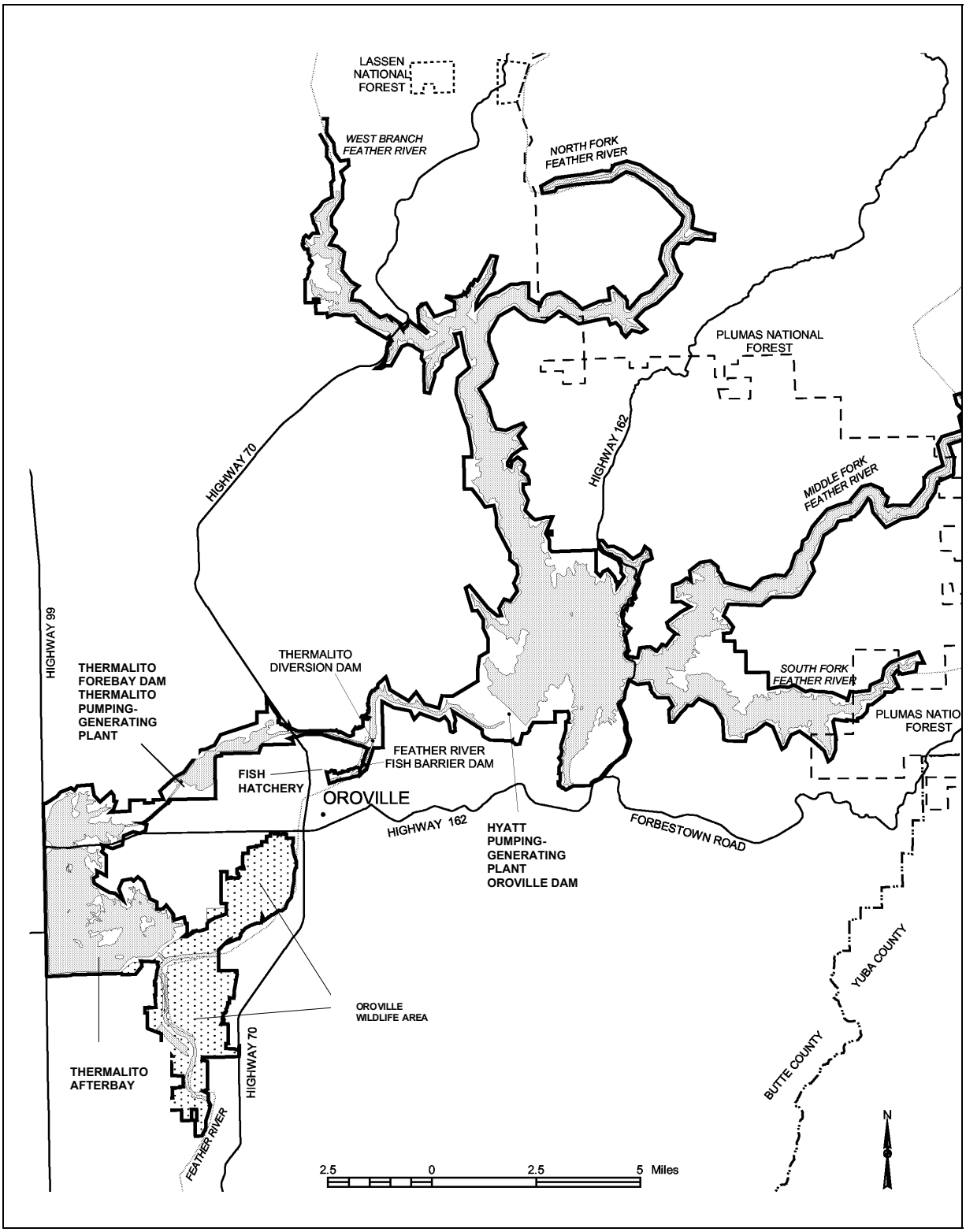

Figure C.1.2-1 Oroville Facilities Feature Location Map

2.0 CONSTRUCTION HISTORY

The Oroville Division was first authorized by the Legislature in 1951 as part of the Feather River Project. The original application for a license from the Federal Power Commission (FPC), predecessor to the Federal Energy Regulatory Commission, to construct facilities at Oroville was dated January 31, 1952. This license application was revised August 31, 1953, and further amended October 31, 1955. In 1955 the Division of Water Resources, Department of Public Works, predecessor to Department of Water Resources, submitted a second report to the Legislature on the Feather River Project. This report found that the Feather River Project, including the Oroville Facilities, had engineering and financial feasibility and recommended that construction proceed. The Federal Power Commission issued an order to the Water Project Authority issuing a license (major) on December 14, 1956, for the Oroville Facilities (Feather River Project, Oroville division). This order covered the project for a concrete dam and power generating facilities. Subsequently the Legislature set up a new agency, the Department of Water Resources, and gave it the authority to implement the State Water Plan. On February 11, 1957, the Federal Power Commission issued a 50-year license, effective February 11, 1957, to the Department of Water Resources to construct and operate the Oroville Facilities (FERC Project No. 2100) in Butte County, California. Funds were appropriated for construction in 1957.

DWR submitted an amendment to the Federal Power Commission dated October 30, 1959, which reflected changes to include an embankment type dam as opposed to the concrete type dam previously approved and added the Thermalito power features. This amendment included an increase in the power output of the project due to the addition of the Thermalito Pumping-Generating Plant and an increase in the capacity of Hyatt Pumping-Generating Plant (formerly called Oroville Powerplant). This amendment, with subsequent modifications, was finally approved by the FPC on July 11, 1962. The approval covered the zoned earth and rockfill section for Oroville Dam and the design proposed for the Thermalito Diversion Dam.

2.1 DAMS, RESERVOIR & POWER FACILITIES

2.1.1 Lake Oroville (also known as Oroville Reservoir)

The Lake Oroville area is rich in gold mining history. Gold was discovered in 1848 at Bidwell Bar, a larger sandbar named after John Bidwell, who became one of California's leading citizens. The resulting rush of gold-seekers created the city of Oroville, county seat of Butte County. Lake Oroville with its auxiliary facilities was built by DWR. Its major function is to conserve and regulate the flows of the Feather River for subsequent release for various project purposes. The maximum capacity of the lake is 3.5 million-acre-feet. It was formed by damming the Feather River. Lake Oroville began to fill on November 14, 1967, when the second of two diversion tunnels that carried the Feather River beneath the embankment during construction was blocked. It was formally

dedicated on May 4, 1968 and was added to the Northern California water system in the same year.

2.1.2 Oroville Dam

In 1960, voters approved a bond issue to begin construction of Oroville Dam. All of the dam and lake structures were designed by DWR. Construction of the project commenced in 1957 with highway and railroad relocation of Highway 70 and the Union Pacific Railroad. Actual work on the dam began in 1961 by the Oro Dam Constructors. The embankment was topped out in October 1967, and the spillway was finished in February 1968. The official dedication ceremony was held on May 4, 1968.

Oroville dam is located in the foothills on the western slope of the Sierra Nevada, one mile downstream of the junction of the Feather River's major tributaries. It's the highest earthfill dam in the U.S. rising 770 feet above streambed excavation and spanning approximately 5,600 feet between abutments. The dam forms the impoundment for Lake Oroville and the upstream control for the Oroville Facilities. Design and construction of the project was multi-faceted and included construction of the dams, tunnels, outlets, spillways, powerplant and operating facilities, and the relocation of upstream and downstream infrastructure (bridges, roads, etc).

The Oroville Dam and Lake Oroville were formally transferred from a construction to an operational status on December 17, 1969 and approved on December 19, 1969.

2.1.3 Saddle Dams

Early designs for Bidwell dam combined the location for Oroville Quincy Road and Feather River Railroad with the dam. That is, the dam crest was to be wide enough to carry both the road and railroad.

Saddle dams included the Bidwell Canyon and Parish Camp Saddle dams. These two dams are low earthen structures which complement Oroville Dam in containing Lake Oroville. They are part of the State Water Project, Oroville Division authorized by the Burns Porter Act of 1959. The dams were constructed in 1967, under specification No. 66-42, Oroville Peripheral Dams, Contract No. 355655. The contractor was Harms Brothers of Sacramento.

2.1.4 Hyatt Pumping-Generating Plant (Edward Hyatt Powerplant)

Located in rock in the left abutment near the axis of Oroville Dam, Hyatt Pumping-Generating Plant (formerly called Oroville Powerplant) is an underground, hydroelectric, pumping-generating facility. The facility was named for Edward Hyatt, who was State Engineer (1927-1950) of the Division of Water Resources under the Department of

Public Works. Hyatt Pumping-Generating Plant has six generators (three for reversible pump back operation), and a license capacity of approximately 645 MW.

Construction of the plant began in 1964 by McNamara-Fuller, a Joint Venture, located in Burlingame, California. Final inspection was completed and accepted on April 4, 1967. The contract was formally accepted by DWR on May 16, 1967.

2.1.5 Thermalito Diversion Pool

The Thermalito Diversion Pool acts as a forebay when Hyatt Pumping-Generating Plant is pumping water back into Lake Oroville. It also provides recreational opportunity. This pool stores 13,350 acre-feet with water surface elevation of 225 feet, 320 acres water surface area and 10 miles of shoreline.

2.1.6 Thermalito Diversion Dam

Thermalito Diversion Dam forms the Diversion Pool, on the Feather River immediately downstream from the tailrace of the Hyatt Pumping-Generating Plant. It diverts water in Thermalito Power Canal for power generation at Thermalito Pumping-Generating Plant and creates a tailwater pool for Hyatt Pumping-Generating Plant. Due to the combined nature of Thermalito Diversion Dam and Oroville Dam, minimal plant facilities were constructed at Thermalito. The cableway used at Oroville Dam was also moved to Thermalito.

The Thermalito Diversion Dam and appurtenances consist of a concrete gravity dam, outlet works, access and maintenance roads, canal intake structure, and a section of Thermalito Power Canal. The constructor was instructed to proceed with the work on August 13, 1962. Construction under the main contract was completed April 26, 1968. The diversion dam was placed in service in October 1967.

2.1.7 Thermalito Diversion Dam Powerplant

Thermalito Diversion Dam Powerplant is located at Thermalito Diversion Dam below the left abutment of the dam and has a license capacity of approximate 3 MW, 615 cfs, normal static head is 63-77 feet with design dynamic head of 67 feet.

The powerplant generates electricity from water released to the Feather River to maintain fish habitat between Thermalito Diversion Dam and Thermalito Afterbay Outlet. Construction was completed on August 26, 1987.

2.1.8 Thermalito Power Canal.

Thermalito Power Canal, concrete-lined with 10,000 feet length and maximum generating flow of 16,900 cfs and maximum pumping flow of 9,000 cfs, extends from a

headworks structure, which is part of Thermalito Diversion Dam to Thermalito Forebay. It conveys water in either direction between Thermalito Diversion Dam and Thermalito Forebay for pumping and power generation at Hyatt Pumping-Generating Plant and Thermalito Pumping-Generating Plant.

The contract for construction of the Power Canal was awarded on September 8, 1965. The actual work began October 7, 1965 by Morrison-Knudsen Co., Inc. and was completed on October 15, 1967. The canal was placed in service during October 1967.

2.1.9 Thermalito Forebay

Thermalito Forebay consists of the dam, reservoir, Nelson Avenue county road relocation and recreation areas. It is an offstream reservoir contained by Thermalito Forebay Dam on the south and east and by Campbell Hills on the north and west, and it was located about four miles west of the city of Oroville.

Thermalito Forebay conveys generating and pumping flows between Thermalito Power Canal and Thermalito Pumping-Generating Plant, provides regulatory storage and surge damping for the Hyatt-Thermalito power complex, and serves as a recreational site.

The maximum operating storage of Thermalito Forebay is 11,770 acre-feet; water surface elevation is 225 feet while water surface area is 630 acres with 10 miles of shoreline.

Plans for Thermalito Forebay and Afterbay were completed in June 1965 and construction was completed in October 1967.

2.1.10 Thermalito Forebay Dam

Thermalito Forebay Dam was constructed between 1965 and 1968 by Guy F. Atkinson Co. of South San Francisco. Thermalito Forebay Dam is homogeneous and zoned earthfill dam, located on the north and west of Thermalito Forebay. Its embankment volume is 1,840,000 cubic yards; height of 91 feet with the crest length of 15,900 feet and 231 feet crest elevation.

2.1.11 Thermalito Pumping-Generating Plant

Located about four miles west of the city of Oroville in Butte county, Thermalito Pumping-Generating Plant is a principal feature of the Oroville Facilities pump storage power complex. A pumping-generating plant, the facility is operated in tandem with Hyatt Pumping-Generating Plant and Thermalito Diversion Dam Powerplant to produce power.

The pumping capacity is 9,120 cfs, 120,000 hp; normal static head is 85-102 feet and design dynamic head is 99 feet with three pumping units while generating capacity is 120 MVA, 17,400 cfs. Normal static head is 85-102 feet and design dynamic head is 95 feet with four generators (three for reversible pump back operation).

Water released for power in excess of local and downstream requirements is conserved by pumpback operation during off-peak hours through both power plants into Lake Oroville to be subsequently released for power generation during periods of peak power demand. Construction on the plant, by Guy F. Atkinson Company, began in December 4, 1964 and was completed in January 24, 1969 and accepted in February 13, 1969, with operation of one pump generator unit (No. 4) in February 1968, and another (No. 3) in April 1968.

2.1.12 Thermalito Afterbay

Located about six miles southwest of the city of Oroville, Thermalito Afterbay is an offstream reservoir. It provides storage for the water required by pumpback operations to Lake Oroville, helps regulate the power system, produces controlled flow in the Feather River downstream from the Oroville Facilities, and provides recreation. The maximum operating storage of Thermalito Afterbay is 57,040 acre-feet; water surface elevation is 136.5 feet and water surface area is 4,300 acres with 26 miles of shoreline.

On October 12,1967, water was released through the bypass of Thermalito Pumping-Generating Plant into a small, temporarily diked area of the Thermalito Afterbay. The initial filling of Thermalito Afterbay began on November 15,1967, with the commencement of regulated releases from Lake Oroville. Releases from the Thermalito Afterbay to the Feather River commenced on December 26, 1967.

2.1.13 Thermalito Afterbay Dam

Thermalito Afterbay Dam has the longest crest in the State Water Project system; it is an homogeneous earthfill dam with an embankment volume of 5,020,000 cubic yards. The dam height is 30 feet with crest length of 42,000 feet and 142 feet crest elevation. The facility was constructed by Guy F. Atkinson Company, from October 25, 1965 to April 1, 1968 and completed on April 19, 1968.

2.1.14 Thermalito Afterbay Outlet

Thermalito Afterbay Outlet is the biggest outlet structure in the Thermalito Afterbay. Outlet structures in Thermalito Afterbay are Thermalito Afterbay Outlet, Sutter Butte Outlet, PG&E lateral Outlet, Richvale Irrigation District Outlet and Western Canal Outlet. The Thermalito Afterbay Outlet consists of five 14-foot by 14-foot radial gates with maximum capacity of 17,000 cubic feet per second.

A construction contract was awarded on December 1965, and Thermalito Afterbay Outlet was completed in August 1969 by Rodney Hunt Machine Company.

2.2 EXISTING ENVIRONMENTAL AND RECREATION COMMITMENTS

2.2.1 Feather River Fish Hatchery

The Department of Fish and Game, in February 1960, proposed a fish hatchery on the north bank of the Feather River downstream of the Oroville-Chico Bridge. The facility was cooperatively planned by DWR and the California Department of Fish and Game, with the advice of the U.S. Fish and Wildlife Service and other agencies

The Feather River Fish Hatchery was built to compensate for spawning grounds lost to returning salmon and steelhead trout with the construction of Oroville Dam. The first salmon and steelhead entered the hatchery in September 1967. In a ten-year period (from 1981 to 1991), the return of spawning adult salmon increased from an average of 39,000 to an average of 51,000 per year.

The Feather River Fish Hatchery comprises a barrier dam on the Feather River, a fish ladder, fish trapping and handling facilities, a maintenance and office building, access and maintenance roads and a fish loading area. Funding was provided by the State Water Contractors and DWR. It is operated by the Department of Fish and Game and maintained by DWR. Work recently completed at the Feather River Fish Hatchery has improved conditions for the rearing of fish and made it easier for visitors, including those with disabilities, to observe hatchery operations.

The construction of the Feather River Fish Hatchery, by Farzier-David Construction Co., contract No. 351872, started on March 16, 1962 and was completed on May 8, 1964. Peterson & Brown – Ely Company expanded the Feather River Fish Hatchery. Expansion work began on May 16, 1966 under contract No. 354906, and was completed on December 12, 1967, and final inspection of the completed work was made on December 18, 1967. Transfer of the Feather River Fish Hatchery to operational status was approved in June 1968. The Hatchery is operated by the Department of Fish and Game. It was expanded again by Westcon Company on July 10, 1997, contract No. C51131, and completed on October 20, 1997.

2.2.1.1 Fish Ladder

Salmon and steelhead, raised at the hatchery, are released in the Feather River and in the Sacramento-San Joaquin Estuary to find their way to the Pacific Ocean where they grow and mature. After two to four years in the ocean, they instinctively return to their place of origin. They proceed through the Delta and up the Sacramento River. They then continue their journey up the Feather River to the hatchery. Major features to

guide the fish from the Feather River to the hatchery include the fish barrier dam and fish ladder.

The fish ladder located immediately downstream from the barrier dam is a reinforced concrete structure, 2,150 feet long, pool length from 8 to 1,000 feet and minimum width of 6 feet. The water depth is 2 feet minimum. The velocity of flow in the fish ladder is from two to five feet per second with maximum drop between pools of one foot.

2.2.1.2 Hatchery Spawning Building

The Hatchery Spawning Building is the location where artificial spawning takes place. The main hatchery building houses the spawning operations area and incubators. On either side of the building, just beyond the gathering tank are viewing windows where the spawning operations can be observed by the public.

2.2.1.3 Rearing Raceways

Concrete-lined raceways block off in intervals to form 48 individual pools 100 feet long, 10 feet wide. The raceways hold young fish fingerlings and yearlings until they are ready for release.

Water flow and velocity in the raceways are 3 to 5 cubic feet per second at 0.1 foot per second.

2.2.1.4 Thermalito Fish Rearing Facility

Located on the west side of the Thermalito Afterbay, the facility is used to raise salmon fry susceptible to the Sacramento River Chinook Disease (a cold water virus). Its two rearing pond raceways can raise 2.5 million fingerlings for planting in the Central Valley river system.

2.2.1.5 Ultraviolet Water Treatment Facility

A new ultraviolet water treatment system at the Feather River Fish Hatchery delivers disinfected water to two new fish-rearing raceways (and to the hatchery's older raceways), as well as to a new hatchery building.

2.2.1.6 Fish Barrier Dam and Pool

The Fish Barrier Dam and Pool, located upstream of the Feather River Fish Hatchery, divert fish into a fish ladder that leads to the hatchery. Flows at the dam are controlled by releases at Oroville Dam and Thermalito Diversion Dam.

The Fish Barrier Dam was constructed as part of the Oroville Facilities. The design, plans and specifications were started in March 1961. Construction of the dam began in April 1962 and was completed in May 1964. It is a concrete gravity dam with 9,300 cubic yards of concrete 91 feet height. The crest length and crest elevation is 600 feet and 181 feet, respectively while the Fish Barrier Pool is 580 acre-feet gross storage capacity, 50 acres water surface area, and one mile of shoreline.

2.2.2 Recreation Facilities

The Federal Water Projects Recreation Act creates a uniform policy for federal water development projects with regard to the purposes of recreation and fish and wildlife enhancement. Assembly Bill No. 12 of the 1966 first Extraordinary Session of the Legislature essentially corresponds with the original form of Assembly Bill No. 1147 as originally introduced during the 1965 Regular Session. The Bill would have provided a continuing annual appropriation of $5 million from tideland oil and gas revenues to reimburse expenditures from project funds for recreation and fish and wildlife enhancement. Assembly Bill No. 12 was signed into law by Governor Edmond G. Brown on April 22, 1966.

2.2.2.1 Lake Oroville Visitor Center

The Lake Oroville Visitor Center was built between 1973 and 1974 and is located just east of Oroville Dam, high above the lake atop Kelly Ridge. This vantage point provides a commanding view of the dam, Bidwell Bar Bridge, and various arms of Lake Oroville. In addition to informational displays inside the Visitor Center, there is a 47-ft viewing tower that provides a panoramic view of Lake Oroville and its surroundings. Exhibits in the center focus on the history of early water development, the construction of the Oroville Facilities, and the State Water Project and its benefits. Parks and recreation exhibits look at the history of the Oroville area and its resident wildlife.

2.2.2.2 Bidwell Canyon and Lime Saddle Marinas

Two marinas at Lake Oroville provide a variety of recreational activities including boat rentals. Bidwell Canyon Marina has a seven-lane boat-launching ramp, which was recently extended to 700 ft msl. It is located approximately one mile East of Oroville Dam on the southern shore of Lake Oroville. Lime Saddle Marina has a three-lane boat-launching ramp, picnic facilities, fishing and boating supplies, gas and oil. The marina is located on the West Branch of the Feather River near Lime Saddle Road.

Both Bidwell Canyon and Lime Saddle Marinas' projects were completed in January 2003 by Guiton & Sons constructor.

2.2.2.3 Spillway Recreation Area at Oroville Dam

The Spillway Recreation Area at Oroville Dam has a boat launching ramp that consists of two multi-lane, eight lanes and 12 lanes, in addition to a variety of outdoor recreation. The boat launch ramp was recently extended to 700 ft msl, providing use of the ramp at lower reservoir levels than was previously available. This site also provides day-use activities such as picnicking and bike riding. This Spillway Boat Launch and Day Use Area was recently reconstructed to improve traffic patterns and add several amenities to enhance recreation and scenery at the boat launching area. The reconstruction project started in June 2001 and was completed in 2003 by C & C Construction.

2.2.2.4 Enterprise Ramp and Day Use Area

The Enterprise Ramp and Day Use Area provides boat launching access. It has a two-lane boat launch ramp. The end of the ramp is at approximately 830 ft msl. It was built between 1975 and 1976.

2.2.2.5 Car-Top Boat Launch Ramps

The Lake provides car-top Boat Ramp access at Dark Canyon, Foreman Creek, Nelson Bar, Stringtown, and Vinton Gulch. These locations also provide access to boaters launching canoes and other water crafts.

Dark Canyon Car-Top Boat launch Ramp has a single-lane boat launch ramp. There are three pull-out areas between the parking lot and the end of the boat launch ramp, which is helpful because the road is narrow. Foreman Creek Car-Top Boat Launch Ramp has a two-lane boat launch ramp that is used at low water. Nelson Bar Car-Top Boat Launch Ramp is located on the West Branch of the North Fork arm of Lake Oroville.

2.2.2.6 Campground and Day Use Areas

Lake Oroville has several campground facilities around the lake that includes Bidwell Canyon Campground and Day Use Area, Lime Saddle Campground and Day Use Area, and Loafer Creek Campground and Day Use Area. Recreation use of Lake Oroville commenced on April 4, 1968 when the Loafer Creek recreation area and the spillway boat ramp were opened to the public.

Bidwell Canyon Campground facilities include a visitor information station and fee collection booth as well as a marina. The boat launch ramp was recently extended to 700 ft msl, providing use of the ramp at lower reservoir levels than was previously available. The project was completed in January 2003.

Lime Saddle Campground, built in 2001, is one of the major attractions of the Oroville Complex, 43 single-vehicle parking spaces and 127 car/trailer spaces in the main parking area.

Loafer Creek Campground is the largest campground. It has 137 family campsites, each containing a parking space, table, and stove. Drinking water, restrooms, hot showers, and laundry tubs are nearby.

2.2.2.7 Boat-in Campsites

Several camps around Lake Oroville are accessible only by boat. Each contains six to ten individual campsites, except for the camp at South Bloomer, which will accommodate groups up to 75. The boat-in camps have cleared and leveled spots for tents, tables, stoves, garbage cans, and pit toilets are provided at each site. The boat-in campgrounds (BIC) are located at Bloomer Area include Bloomer Cove, Bloomer Knoll, Bloomer Point and Bloomer Group, Craig Saddle, Foreman Creek, and Goat Ranch.

The boat-in camps were constructed in the winter of 1970 by Department of Parks and Recreation personnel and Conservation Camp crews from the State Division of Forestry and Department of Corrections.

2.2.2.8 Floating Campsites

Ten floating campsites, located in Potters Ravine about 2-1/4 miles from the Bidwell Canyon Campground launch ramp, are available on Lake Oroville. Each 20x24 ft floating platform includes a camp table, two-burner propane cook stove, propane barbeque, food storage locker and cabinets, covered living area, and an upstairs deck. A limited supply of drinking water is provided, and a flush toilet with holding tank is part of each campsite. The restroom area includes space for changing clothes. Lockable storage space is also provided on the campsite. Each floating campsite is limited to 15 occupants, and all sites are suitable for handicapped use.

2.2.2.9 Diversion Pool Day Use Area

The Diversion Pool Day Use Area, located below the dam and above Thermalito Forebay, is open for day-use activities such as swimming and picnicking. Only non-motorized boats are allowed in this area. The only developed facility in this area is a vault restroom; two shoreline points have been enhanced with gravel to facilitate launching.

2.2.2.10 North Thermalito Forebay Recreation Area

Operations of the North Thermalito Forebay Recreation Area commenced on October 11,1967, when water was allowed to flow from the Diversion Dam Pool into the Power Canal and then into the Forebay. It offers a 300-acre day-use area for picnicking, swimming, as well as in-route camping. The North Thermalito Forebay Recreation Area is reserved exclusively for sailboats, canoes, and other nonpower-driven boats. The 200 yard sandy swimming beach is complemented by men's and women's dressing rooms and chemical toilets are nearby. New restroom, utilities and improvements were constructed in 1997 and completed in 1998 by J.R.L Construction. Parking renovation was started in 2000 and finished in 2001 by Franklin Construction.

2.2.2.11 South Thermalito Forebay Recreation Area

Operations of the South Thermalito Forebay Recreation Area commenced on October 11, 1967. It provides outdoor recreational activities such as boating, picnicking, fishing and swimming. Power boating and fishing are the main attractions. The construction of a four-lane Boat Launch started in 1970 and was finished in 1971.

2.2.2.12 Monument Hill Day Use Area

Monument Hill Day Use Area is open for boating, swimming, fishing, picnicking and limited hunting. The surface and shoreline are within the Oroville Wildlife Area (OWA), but recreation facilities and boat ramps are managed by DWR. The parking lot was improved by Franklin Construction from October 1998 and completed in April 1999.

2.2.2.13 Thermalito Afterbay Launch Ramps

Thermalito Afterbay Launch Ramps include Larkin Road Launch Ramp, Monument Hill Launch Ramp and North Wilbur Road Launch Ramp. Robinson Construction Company constructed the entry road and extruded concrete curbs of Larkin Road Launch Ramp from February 1999 to February 2000. The boat boarding floats and gangway of Monument Hill Launch Ramp was constructed from October 1993 and finished on October 1994 by Hallsten Corp, and modified by Clayborn Construction Company from August 1998 to January 1999. North Wilbur Road Launch Ramp's boat boarding floats and piles were built by Clayborn Contracting Group between 1998 and 1999. The boat launch ramp consists of a two-lane paved boat launch ramp and parking lot able to accommodate 14 car/trailer combination spaces. There are several boat launching areas not graded and are consequently only suited for car-top launching.

2.2.3 Oroville Wildlife Area (OWA)

Located southwest of Lake Oroville, the OWA contains a series of ponds and levees adjacent to the Feather River including the Thermalito Afterbay. The Thermalito

Afterbay Outlet Camping Area also provides swimming and fishing access to the OWA ponds and the Feather River. Fishing, hunting, nature study, and river-associated recreation such as shooting and hunting are the primary activities at the wildlife area.

The construction history of the recreation facilities is summarized in Table C.2.0-1

2.3 ADDITIONS/MODIFICATIONS

2.3.1 Turbine Refurbishment – Units 1, 3, 5

Turbine Refurbishment for Hyatt Pumping-Generating Plant is currently underway. The reassembly and refurbishment of Unit 5 is done. This unit was watered up on June 27, 2003 and start up testing by June 30, 2003. The second unit was released for refurbishment on February 18, 2003 while the third unit was scheduled for disassembly in October 2003. The contract for turbine refurbishment was awarded to Voest-Alpine MCE Corp. on December 31, 1998, contract number C51167. The contractor sent a notice to begin work (NTBW) to DWR on February 2, 1999. This project is estimated to be completed on March 31, 2004. The refurbishing work is continuing.

2.3.2 Furnish Governor Replacement

Hyatt Pumping-Generating Plant and Thermalito Pumping Generating Plant's governor replacement are almost complete. Unit 1 commissioning is completed. All item governors have been delivered and installed. Sulzer Compression, Inc. contractor started the governor replacement on November 24, 1999, contract number C51193. This project is still under construction.

2.3.3 Turbine Replacement – Units 2, 4, 6

Turbine Refurbishment for Hyatt Pumping-Generating Plant – Units 2, 4, and 6 began on November 7, 2001 by G.E. Hydro Power, Inc., contract number C51239. Contractor has postponed pump turbine model tests in order to optimize the final model design. The schedule for the model test was set for September 2003. The Turbine Refurbishment is expected to be completed on December 15, 2006.

2.3.4 Furnish Spare Stator Coils

Contract was awarded to G.E. Hydro Power, Inc., contract number C51259, for Furnishing Spare Stator Coils at Thermalito Pumping-Generating Plant. Notice to Begin Work was received on September 6, 2002. Prototype sample coils have been successfully tested. Production coils were scheduled to be manufactured, beginning

July 7, 2003. The stator lamination was manufactured and delivered to the site. This project is estimated to be completed on February 18, 2004.

2.4 TRANSMISSION LINES AND SUBSTATIONS

The license capacities of Hyatt Pumping-Generating Plant and Thermalito Pumping-Generating Plant are 645 MW and 114 MW respectively. Design and construction were authorized in 1964 under provisions of the Burns-Porter Act. The Department of Water Resources entered into the contract on April 21, 1965 with the consulting firms of St. Maurice-Helmkamp-Musser, as sponsor of a joint venture. Maurice-Helmkamp-Musser was responsible for the survey, and International Engineering Company, Inc., was responsible for design. After changing the plan several times by Amendment I, dated September 1, 1965, Amendment II, dated January 1, 1966, and Amendment III, dated October 13, 1966, the final transmission and circuit tower lines were built. Two lines of double circuit towers carrying three 230kV circuits extend from the Hyatt Pumping-Generating 230kV Switchyard to the Table Mountain Tap. From Table Mountain two lines of double circuit towers carrying three circuits extend to the Pacific Gas and Electric Company's Table Mountain substation and one double circuit line goes to the Thermalito Pumping-Generating Plant 230kV Switchyard. The distance from the Hyatt Pumping-Generating 230kV Switchyard and Thermalito Pumping-Generating Plant Switchyard to the Pacific Gas and Electric Company Table Mountain substation are about nine miles and 2.3 miles respectively. In addition to the above transmission lines, two underground 15kV transmission lines, 3.9 miles long and 1.1 miles long connecting the Thermalito Diversion Dam Powerplant Switchyard with the upstream Hyatt Pumping-Generating Switchyard and downstream Feather River Fish Hatchery.

The construction history of the Oroville Facilities (Project No. 2100) is summarized in Tables C.2.0-2 and C.2.0-3.

Table C.2.0-1. Summary of Construction Activities and Modifications to Oroville Recreation Facilities

Facilities	Start of Construction	Construction Completed	Constructor
A. Campground:			
- Bloomer Cove Boat-In Campsite (BIC)	1973	1974	
- Bidwell Canyon Campground	06-Nov-81 Oct. 95	12-Dec-81 Jan. 96	Robinson Const. Co. Clayborn Const. Co.
- Floating Campsites (Spec. 96-03)	01-May-96	13-Sept-96	Weston Const. Corp.
- North Thermalito Forebay RV "En Route" Campground	01-May-96	01-Oct-96	DWR
- Lime Saddle Campground (Spec. 00-14)	27-Sept-00	03-Jun-02	Remcon
B. Day Use Area (DUA):			
- Spillway Boat Launch Area and DUA	1965 1968 2001	1966 1969 2003	C & C Construction
- Feather River Fish Hatchery	16-May-66 06-May-98	12-Dec-67 29-Jul-99	Peterson & Brown Ely Ginno + K9 Const. Inc.
- Loafer Creek Boat Launch Area	1966	1967	
- Lime Saddle Boat Launch Area and DUA	1971 1975 1993	1972 1976 1994	Guiton & Sons
- Lake Oroville Visitor Center	1973	1974	
- Enterprise Boat Launch Ramp	1973	1974	
- Bidwell Canyon Boat Launch Area and DUA	01-Nov-89 09-Sept-92 Nov-02	15-Dec-89 10-Dec-92 Feb-03	The Holland Co. Clayborn Contr. Group Guiton & Sons
- Thermalito Afterbay (North Wilbur Road) Boat Launch Area	08-Dec-93	26-Jan-94	Clayborn Contr. Group
- Oroville Dam restrooms and lighting	04-Mar-94	31-Mar-95	DWR
- Diversion Pool (Cherokee Road access)	01-Jul-95	14-Jun-96	DWR
- Thermalito Afterbay (Monument Hill) Boat Launch Area and DUA (Spec. 95-30)	07-Nov-95 Oct. 1998	24-Jun-96 Apr. 1999	Claborn Contracting Group Franklin Const.
- North Thermalito Forebay DUA	25-Oct-96 1997 2000	06-Jun-97 1998 2001	Mark Guiton & Assc. J.R.L Const. Franklin Const.
- Floating Restrooms	01-Aug-98	08-May-99	DWR
- Thermalito Afterbay (Larkin Road) Car-Top Boat Launch Area	Feb. 1999	Feb. 2000	Robinson Const. Co.

Sources: Final Construction reports/O & M License and Regulatory Compliance Sect.

Table C.2.0-2. Chronology of Progress of Construction

Activity	Start of Construction	Construction Completed	Constructor
DAM, RESERVOIR & POWER FACILITIES			
Diversion Tunnel No. 1 (Spec. 61-05)	18-Aug-61	16-Jan-64	Frazier Davis Const. Co.
Palermo Outlet Works (Spec. 61-15)	11-Dec-61	03-Jun-63	Morrison-Knudsen Co.
Oroville Dam (Spec. 62-05)	13-Aug-62	29-Jun-68	Oro Dam
Construction of Construction Headquarter (Spec. 62-27)	16-Nov-62	12-Dec-63	A. Teichert & Son
Furnishing & Installing Turbines and Pumps (Spec. 63-05)	17-Jun-63	18-Feb-71	Allis-Chalmers Manufacturing Co.
Hyatt Pumping-Generating Plant (Spec. 63-06)	24-Jun-63	16-May-67	McNamara Corp. & G.A. Fuller Co.
Quincy Rd. Relocation Oroville-Forbestown (Spec. 63-35)	03-Jan-64	08-Sep-65	Piombo Construction Co.
Thermalito Turbines, Pump – Turbines and Governors (Spec. 63-39)	25-Feb-64	17-Mar-70	Allis-Chalmers
Furnishing 114 Inch Spherical Valves (Spec. 64-13)	30-Mar-64	16-May-69	Baldwin-Lima-Hamilton
Furnishing & Installing Generator&Motor/Generator (Spec. 64-16)	03-Jul-64	04-May-72	Westinghouse Corp.
Thermalito Power Canal Relocation (Spec. 64-31)	30-Oct-64	10-Nov-65	Osborn Construction Co.
Thermalito Pumping-Generating Plant (Spec. 64-37)	04-Dec-64	13-Feb-69	Guy F. Atkinson Co.
Furnishing Radial gates and hoists for Thermalito Diversion Dam (Spec. 64-43)	15-Dec-64	16-Nov-66	Berkeley Steel Const. Co., Inc.
Clearing Oroville Reservoir site (Spec. 65-05)	12-Apr-65	08-Jun-67	C.J. Langenfelder & Son, Inc.
Intake Trashracks and Shutters (Spec. 65-11)	30-Apr-65	22-Dec-67	Michel & Pfeffer Iron Works, Inc.
Furnishing and Installing One Generator and Three Motor – Generators Thermalito Pumping Plant (Spec. 65-02)	03-Jun-65	03-Sep-69	Allis-Chalmers
Oroville Dam Spillway (Spec. 65-09)	25-Jun-65	12-Mar-68	Oro Pcfc Cnst & G. Farnsworth Cnst. Corp.
Feather Falls Rd. Relocation South Fork Feather River Bridge and Roadway (Spec. 65-26)	10-Aug-65	24-Jan-68	Rthchld, Rfin & Wirck, Inc. & Piombo Const. Co.
Power Transformer-substation Transformer & Lighting (Spec. 65-31)	25-Aug-65	18-Aug-69	Moloney Electric Co.
Thermalito Power Canal (Spec. 65-37)	07-Oct-65	31-Oct-67	Morrison-Knudsen Co., Inc.
Thermalito Forebay and Afterbay (Spec. 65-27)	25-Oct-65	19-Apr-68	Guy F. Atkinson Co.
Falls Road Relocation Feather (Spec. 65-23)	23-Dec-65	28-Sep-67	O.K. Mittry & Son
230 KV Power Circuit Breakers (Spec. 65-38)	29-Dec-65	25-Feb-69	General Electric Co.

Table C.2.0-2. Chronology of Progress of Construction

Activity	Start of Construction	Construction Completed	Constructor
DAM, RESERVOIR & POWER FACILITIES			
Completion of Hyatt Pumping-Generating Plant (Spec. 66-32)	31-Aug-66	23-Jun-69	Wismer & Becker
Oroville-Thermalito Control system (Spec. 66-44)	17-Oct-66	18-May-72	Philco Corp.
Oroville Operation & Maintenance Center (Spec. 66-52)	23-Jan-67	15-Apr-68	Christensen & Foster
Oroville-Thermalito Bus Lines (Spec. 67-01)	06-Feb-67	29-Aug-68	Wismer & Becker Contracting Engineers
Completion of Penstock Intake – Left Abutment (Spec. 65-52)	25-Jan-68	14-May-68	Yuba Consolidated Industries, Inc.
Thermalito Fish Rearing Raceways (83-06)	25-Apr-83	20-Mar-84	Kaweah Construction Co
Powerplant-furnishing Turbine-Generator Governor (Spec. 84-19)	01-Aug-84	03-May-88	Hitachi America, Ltd.
FISH FACILITIES			
Interim Facilities Feather River Hatchery (Spec. 62-01)	16-Mar-62	19-May-64	Frazier-Davis Construction Co.
Feather River Fish Hatchery (Spec. 66-18)	16-May-66	18-Dec-67	Peterson & Brown-Ely

Source: Final Construction reports

The commercial operation date for Thermalito Power Canal, and Thermalito Forebay and Afterbay was 1967, while Oroville Dam, Hyatt Pumping-Generating Plant, and Powerplant-furnishing Turbine-Generator Governor were 1968, 1969, and 1988, respectively.

Table C.2.0-3. Major Capital Additions/Modifications to the Oroville Facilities

Activity	Start of Construction	Construction Completed	Constructor
DAMS, RESERVOIR & POWER FACILITIES			
Motor/Generator Armature Windings (Spec. 78-51)	05-Jan-79	18-Jun-80	The Epoxylite Corporation
Furnishing 230KV Power Circuit Breaker (Spec. 82-29)	08-Oct-82	17-Oct-84	Brown Boveri Electric, Inc.
Thermalito Diversion Dam Powerplant (Spec. 84-44)	04-Dec-84	26-Aug-87	BRC-Resigned to Brown & Root, Inc.
Motor Generator Rewind Units 2, 3, and 4 (Emergency Contract), Thermalito Powerplant (Spec. 89-11)	24-Feb-89	09-Jul-90	Magnetek National Electric Const., Co.
Fiber Optic Cable (Spec. 89-18)	21-Jun-89	18-Apr-90	Clyde G. Steagal, Inc., Mid Valley Elec.
Boating Facilities Renovation – Lime Saddle Boat LA – Lake Oroville (Spec. 95-28)	19-Oct-95	17-Jul-96	Mark Guiton and Associates
Hatchery Expansion and ADA Modifications, Feather River Fish Hatchery and Oroville Area Control Center (Spec. 97-24)	06- May-98	17-Aug-99	Ginno
Turbine Refurbishment – Units 1, 3 and 5 (Spec. 98-22)	02-Feb-99	Going on EST. 3/31/04	Voest-Alpine MCE Corp.
Seal and Pave Roads (Spec. 99-13)	05-Aug-99	16-Aug-00	Franklin Construction
Furnishing Governor Replacement (Spec. 99-19)	24-Nov-99	Going on EST. 5/23/01	Sulzer Compression, Inc
Fabrication/Rehabilitation, Thermalito Diversion Dam and Oroville Dam Spillway (Spec. 99-30)	03-Jan-00	26-Aug-02	Weston
Radial Gates Rehabilitation (Spec. 00-12)	18-Jul-00	26-Nov-01	ARB, Inc.
Radial Gate Rehabilitation (Spec. 00-11)	25-Jan-01	18-Mar-03	Dillingham Construction
Pump-Turbine Refurbishment Units 2, 4 and 6 (Spec. 01-11)	07-Nov-01	Going on EST. 12/15/06	G.E. Hydro Power, Inc.
FISH FACILITIES			
Hatchery Expansion and ADA Modification, Feather River Fish Hatchery and Oroville Area Control Center (97-24)	06-May-98	17-Aug-99	Ginno & K9 Construction Inc.

Source: Final Construction Reports

3.0 PROPOSED NEW FACILITIES AND CONSTRUCTION SCHEDULE

At present, the Department of Water Resources is not proposing any changes to the Oroville Facilities. However, changes to the design of the Oroville Facilities may occur as a result of the relicensing process.

4.0 REFERENCES

DWR (California Department of Water Resources). SP-R10 - Inventory and Condition Report

DWR (California Department of Water Resources). 2002. Management of the State Water Project. DWR Bulletin 132. Sacramento, CA.

DWR (California Department of Water Resources). Management of the State Water Project. DWR Bulletin Number 200. Sacramento, CA November 1974.

DWR (California Department of Water Resources). 2001. Initial information package, relicensing of the Oroville Facilities. Federal Energy Regulatory Commission License Project No. 2100. Sacramento, CA. January 2001.

DWR (California Department of Water Resources). Sixth Part 12 – Safety Inspection Report.

Lake Oroville Website http://www.lakeoroville.water.ca.gov/

California Department of Parks and Recreation publications

Final Construction Reports

State of California
The Resources Agency
Department of Water Resources

DRAFT
EXHIBIT D
STATEMENT OF COSTS AND FINANCING

Oroville Division, State Water Facilities
FERC Project No. 2100

APRIL 30, 2004

ARNOLD SCHWARZENEGGER
Governor
State of California

MIKE CHRISMAN
Secretary for Resources
The Resources Agency

LESTER A. SNOW
Director
Department of Water Resources

State of California
The Resources Agency
Department of Water Resources

DRAFT
EXHIBIT D
STATEMENT OF COSTS AND FINANCING

Oroville Division, State Water Facilities
FERC Project No. 2100

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

AF	acre-ft.
ALP	Alternative Licensing Procedures
APEA	Applicant Prepared Environmental Assessment
BCDA	Butte County Department of Agriculture
BLM	U.S. Bureau of Land Management
CAISO	California Independent System Operator
CEQA	California Environmental Quality Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic ft. per second
DEA	Draft Environmental Assessment
DEIR	Draft Environmental Impact Report
DFG	California Department of Fish and Game
DPR	California Department of Parks and Recreation
DWR	California Department of Water Resources
EA	Environmental Assessment
ECPA	Electric Consumers Protection Act
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
FEA	Final Environmental Assessment
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
IDC	Interest during construction
IIP	Initial Information Package
KW	kilowatt
KWh	kilowatt hour
LFC	low flow channel
LOSRA	Lake Oroville State Recreation Area
maf	million acre-ft.
MTBE	methyl-tertiary butyl ether
msl	mean sea level
MW	megawatt
NEPA	National Environmental Policy Act
NF	North Fork
NGO	Nongovernmental organization
NMFS	National Marine Fisheries Service
NOP	Notice of Preparation
O&M	Operations and Maintenance
PDEA	Preliminary Draft Environmental Assessment

PG&E	Pacific Gas and Electric Company
PM&E	Protection, Mitigation and Enhancement
PNF	Plumas National Forest
RV	recreational vehicle
RWQCB	Regional Water Quality Control Board
SD	Scoping Document
SD1	Scoping Document 1
SD2	Scoping Document 2
SHPO	State Historic Preservation Office
SWP	State Water Project
SWRCB	State Water Resources Control Board
taf	thousand acre-ft.
UC	University of California
USACE	U.S. Army Corps of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish And Wildlife Service

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EXHIBIT D

STATEMENT OF COSTS AND FINANCING

The following information is provided in compliance with the requirements of CFR 18, Chapter 1, Subchapter B, §4.51(e).

1.0 GENERAL PROJECT DESCRIPTION

1.1 OVERVIEW

The Oroville Facilities (FERC Project No. 2100) were developed as part of the State Water Project (SWP), a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose of the SWP is to store and distribute water to supplement the needs of urban and agricultural water users in northern California, the San Francisco Bay area, the San Joaquin Valley, and southern California. The Oroville Facilities are also operated for flood management, power generation, water quality improvement in the Delta, and recreation and fish and wildlife enhancement.

FERC Project No. 2100 encompasses 41,100 acres and includes Oroville Dam and Reservoir, three power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Powerplant, and Thermalito Pumping-Generating Plant), Thermalito Diversion Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal, Oroville Wildlife Area (OWA), Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, and transmission lines, as well as a number of recreational facilities. An overview of these facilities is provided on Figure B.1.1-1. The Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5-million-acre-feet (maf) capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level.

An overview of the Oroville Facilities is provided on Figure D.1.0-1.

1.2 EXISTING POWER FEATURES

The hydroelectric facilities have a combined license generating capacity of approximately 762 megawatts (MW). The Hyatt Pumping-Generating Plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels into the Feather River just downstream of Oroville Dam. The plant has a generating and pumping flow capacity of 16,950 cfs and 5,610 cfs, respectively. Other generation facilities include the 3 MW Thermalito Diversion Dam Powerplant and the 114 MW Thermalito Pumping-Generating Plant.

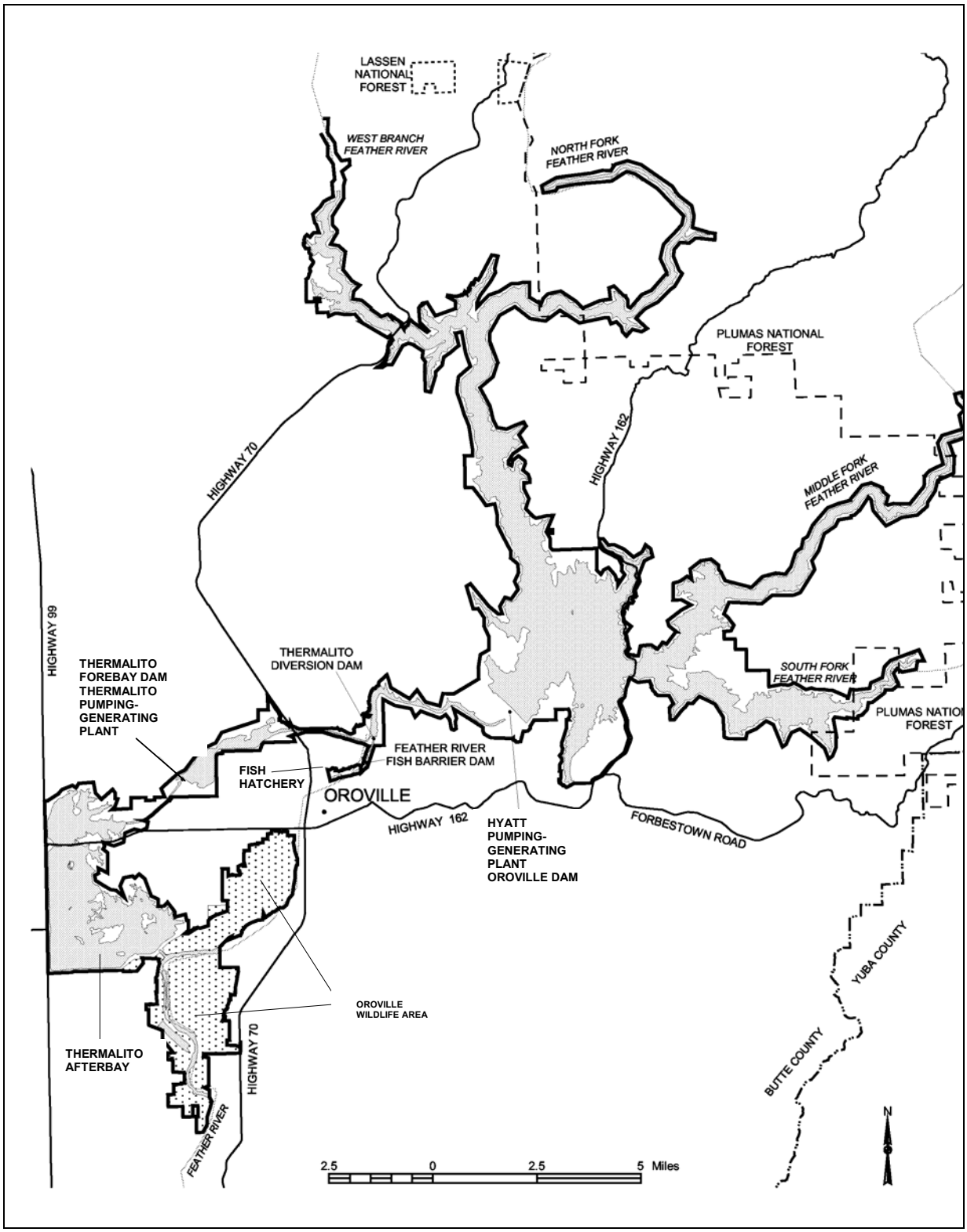

Figure D1.0-1. Oroville Facilities Features Location Map

Thermalito Diversion Dam, four miles downstream of the Oroville Dam creates a tail water pool for the Hyatt Pumping-Generating Plant and is used to divert water to the Thermalito Power Canal. The Thermalito Diversion Dam Powerplant is a 3 MW power plant located on the left abutment of the Diversion Dam. The power plant releases a maximum of 615 cubic feet per second (cfs) of water into the river.

The Thermalito Power Canal is a 10,000-foot-long channel designed to convey generating flows of 16,900 cfs to the Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. The Thermalito Forebay is an off-stream regulating reservoir for the 114 MW Thermalito Pumping-Generating Plant. The Thermalito Pumping-Generating Plant is designed to operate in tandem with the Hyatt Pumping-Generating Plant and has generating and pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into the Thermalito Afterbay, which is contained by a 42,000-foot-long earth-fill dam. Thermalito Afterbay is used to release water into the Feather River downstream of the Oroville Facilities, helps regulate the power system, provides storage for pump-back operations, and provides recreational opportunities. Several local irrigation districts receive water from Thermalito Afterbay.

1.3 EXISTING ENVIRONMENTAL AND RECREATION COMMITMENTS

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the dam and the Thermalito Afterbay Outlet and provides attraction flow for the hatchery. The Feather River Fish Hatchery, an anadromous fish hatchery, was built to compensate for the loss of spawning grounds and rearing areas for returning salmon and steelhead trout and their offspring; the spawning grounds and rearing areas were lost due to construction of Oroville Dam. The hatchery has recently accommodated more than 20,000 adult fish and 15 million young fish annually.

The Oroville Facilities support a wide variety of recreational opportunities. These opportunities include: boating (several types), fishing (several types), fully developed and primitive camping (including boat-in and floating sites), picnicking, swimming, horseback riding, hiking, off-road bicycle riding, wildlife watching, and hunting. There are also visitor information sites with cultural and informational displays about the developed facilities and the natural environment. There are major recreation facilities at Loafer Creek, Bidwell Canyon, Spillway, North and South Thermalito Forebay, and Lime Saddle. Lake Oroville has two full-service marinas, five car-top boat launch ramps, ten floating campsites, and seven dispersed floating toilets. There are also recreation facilities at the Visitor Center and the OWA.

The OWA comprises approximately 11,000-acres west of Oroville that is managed for wildlife habitat and recreational activities. It includes the Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the

Feather River. The 5,000 acre area straddles 12 miles of the Feather River, which includes willow and cottonwood-bordered ponds, islands, and channels. Recreation areas include dispersed recreation (hunting, fishing, and bird watching), plus recreation at developed sites, including Monument Hill Day Use Area, model airplane grounds, three boat launches on Thermalito Afterbay and two on the river, and two primitive camping areas. California Department of Fish and Game's (DFG) habitat enhancement program includes a wood duck nest-box program and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a number of locations.

2.0 PROJECT DEVELOPMENT COSTS

2.1 ORIGINAL PROJECT COSTS

This application is not an application for an initial license, and therefore a tabulated statement providing the actual or approximate original cost is not required under CFR 18, §4.51(e).

2.2 ESTIMATED COST OF PROPOSED CONSTRUCTION

2.2.1 Proposed New Development

No operational changes, new facilities, or facility upgrades are proposed by the applicant to improve power generating potential of the Oroville Facilities.

2.2.2 Proposed Protection, Mitigation and Enhancements

Operational changes or additional facilities to accommodate environmental, fishery, and recreation enhancement measures are being determined through a negotiated settlement agreement process. Costs for any facilities currently under consideration can be found in Section 6.2 of the Preliminary Draft Environmental Assessment (PDEA) document.

3.0 VALUE OF PROJECT AT LICENSE EXPIRATION

The Department of Water Resources, an agency of the State of California, operates the Oroville Facilities as a municipality as that term is defined in § 796 (7) of the Federal Power Act (USCS §§791 a), and therefore, the valuation requested under Section 4.51(e)(2) of FERC's regulations is not applicable to the Oroville Facilities.

4.0 AVERAGE ANNUAL COST OF THE OROVILLE FACILITIES

4.1 COST OF CAPITAL

DWR does not have shareholders and therefore does not finance projects with equity capital. Original, as well as new construction, is financed through the issuance of Revenue Bonds.

In 1994, DWR completed repayment of the original 1964 Oroville Facilities Revenue Bonds, and therefore carries no debt related to the original construction.

Costs of borrowings for new construction that has taken place since the original facilities were completed are reported Bulletin 132, an annual publication produced by DWR and available on the following web site: *wwwswapo.water.ca.gov*

4.2 LOCAL, STATE, AND FEDERAL TAXES

As a State Agency in California, DWR is not subject to payment of any state, local, or federal taxes associated with the Oroville Facilities.

4.3 DEPRECIATION OR AMORTIZATION

Annual debt service payments on outstanding bonds used for State Water Project facilities, including the expansion and improvement of Oroville Facilities are detailed in Table 14-11 of Bulletin 132-02, which is the latest annual report prepared by DWR. This report is dated January 2004.

4.4 ANNUAL OPERATIONS AND MAINTENANCE COSTS

Annual operation and maintenance costs for the Oroville Facilities over the five-year period, from 1996 through 2000, are shown in Table D.4.0-1 below. **[NOTE: This information will be included with the Final License Application in January 2005.]**

Table D.4.0-1 Oroville Facilities Historical Annual Operations and Maintenance Costs

Year	Annual O& M Expenditures
1996	$
1997	$
1998	$
1999	$
2000	$

Source: Table B-13, DWR Bulletin 132-03

DWR performs routine annual maintenance work on the Oroville Facilities and makes capital improvements to ensure efficient operation of the facilities. In 2002, the expenditures for capital improvements totaled $____.

4.5 ANNUAL COSTS OF EXISTING OROVILLE FACILITIES

Table D.4.0-2 shows the annual costs of the Oroville Facilities for calendar year 2000. **[NOTE: This information will be included with the Final License Application in January 2005.]**

Table D.4.0-2 Annual Costs of Oroville Facilities

Debt Service (1)	$
Operations and Maintenance (2)	$
Capital Improvements/Additions	$
FERC Annual Charges (3)	$
Transmission	N/A
Total	**$**

(1) Debt Service is based on a residual of $ in outstanding revenue bond principal allocated to the Thermalito Diversion Dam Powerplant

(2) O&M costs include operation, maintenance, power and annual renewals & replacements

(3) Annual administrative charges DWR has paid to FERC for the past six years are:

1996	$	1999	$
1997	$	2000	$
1998	$	2001	$

4.6 PROJECTED TOTAL ANNUAL COST OF OROVILLE FACILITIES

DWR, State and Federal resource agencies, Indian Tribes, and other stakeholder groups participating in the Oroville Facilities relicensing process are currently negotiating the PM&E measures that will help DWR to continue operating the facilities in a cost efficient manner over the term of the new FERC license. The PDEA defining the preferred alternative will be filed with FERC and distributed for stakeholder comment in January 2005. See Section 6.0 Developmental Analysis of the PDEA Progress Summary for further discussion of the annual costs and benefits of the Oroville Facilities, when PM&E measures anticipated under the new FERC license are considered.

5.0 ANNUAL VALUE OF EXISTING OROVILLE FACILITIES POWER

5.1 ANNUAL REVENUES AND FINANCING

DWR continues to operate the Oroville Facilities in a cost efficient manner while meeting existing recreational and environmental commitments.

5.2 VALUE OF PROJECT GENERATION

Based on findings reported in the PDEA, the economic value of power from the Oroville Facilities ranges between $___ and $___ annually (see Table ___ of the PDEA), depending on forecasted market energy prices. **[NOTE: This information will be included with the Final License Application in January 2005.]**

6.0 ABILITY OF APPLICANT TO FINANCE THE OROVILLE FACILITIES

DWR has experience in participating in bond financing sales under all economic conditions and has bond ratings of "___" with both Standard & Poor's and Fitch. Moody's rates DWR "____." DWR's ratio of assets to current liability is _____; its ratio of long-term debt to capitalization _____ percent.

DWR's Financial Statement is included in Appendix H and further demonstrates its ability to meet all potential obligations under the terms of the new license. **[NOTE: This information will be included with the Final License Application in January 2005.]**